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“Impact of Insurance Status on Health Care Utilization and Quality of Self-Care Among Ethnic Minorities with Type 2 Diabetes”

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ABSTRACT

Title of Dissertation: Impact of Insurance Status on Health Care Utilization and Quality of Self-Care Among Ethnic Minorities with Type 2 Diabetes

Name, Degree, Year: Nicole Angela Vaughn, Ph.D., 2004

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Type 2 diabetes affects 16 million Americans and disproportionately affects ethnic minorities. Specifically, African American and Hispanics are twice as likely to have Type 2 diabetes compared to their Caucasian counterparts. The impact of this disparity goes beyond the greater prevalence of the disease and includes greater morbidity and mortality. The recent Institute of Medicine (IOM) report documents racial and ethnic disparities in the treatment for many different medical conditions, including diabetes. Understanding and combating health disparities among minority groups is a national priority. Many researchers have focused on socioeconomic status (SES) as the main cause in health disparities. Much of the research over the past two decades has examined the impact of health outcomes among the uninsured and much of this research has found that insured individuals have better health outcomes than those without insurance. In order to begin to unravel the myriad of factors that contribute to these health disparities, researchers must further examine whether there are differences among ethnic minorities and Caucasians with health insurance coverage. The current study examined the association of insurance status on health care utilization patterns and quality of self-care behaviors among ethnic minorities and Caucasians with Type 2 diabetes. The 1998 Medical Expenditure Panel Survey (MEPS), a nationally representative sample of the U.S. non-institutionalized civilians, dataset was used in this study. Data were extracted for insured Caucasian, African American, and Hispanic individuals aged 21-64 years with an ICD-9

diagnosis of Type 2 diabetes (i.e., with and without complications). Five hundred six individuals met the inclusion criteria. It was hypothesized that ethnic minorities would have fewer visits to a health care provider and lower expenditures for health care than Caucasians; indicating poorer utilization of care despite all individuals having health insurance coverage (i.e., private or public). There were three major findings of this study after controlling for potential confounds. First, despite having health insurance, low-income individuals with diabetes regardless of ethnicity, underutilized care as per recommended care in various clinical guidelines (i.e., less than 1 visit per year). Second, there were no differences observed in the frequency of prescriptions and prescription expenses for African Americans and Hispanics as compared to Caucasians. Lastly, total health services and out-of-pocket expenses for African Americans and Hispanics were lower than their Caucasian counterparts. The present findings highlight the importance of income level despite insurance on the amount and type of care received for low-income diabetics. There are racial differences in income such that Caucasians had higher mean incomes and therefore, had more money available to spend on medical expenses. One possible implication of these findings is that disparities in utilization and expenditures among racial and ethnic groups may be obscured at lower levels of income among patients with a chronic illness. Thus, ensuring that all individuals (i.e., particularly lower income diabetics) receive quality care, irrespective of income and ethnicity, should continue to be a goal of health care in the United States.

Impact of Insurance Status on Health Care Utilization and Quality of Self-Care

Among Ethnic Minorities with Type 2 Diabetes

by

Nicole Angela Vaughn, M.S.

Dissertation submitted to the Faculty of the Medical Psychology Graduate Program

Uniformed Services University of the Health Sciences

in partial fulfillment of the requirements for the degree of

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INTRODUCTION

Disparities in Health

Type 2 diabetes affects 16 million Americans and disproportionately affects ethnic minorities (ADA, 1999). Specifically, African American and Hispanics are twice as likely to have Type 2 diabetes compared to their Caucasian counterparts (ADA, 2004). The impact of this disparity goes beyond the greater prevalence of the disease and includes greater morbidity and mortality. The recent Institute of Medicine (IOM) report documents racial and ethnic disparities in the treatment for many different medical conditions, including diabetes (IOM, 2002). Understanding and combating health disparities among minority groups is a national priority. Understanding and developing a plan to combat the disparities in health among these groups has been a top national priority. The U.S. Surgeon General announced that understanding barriers to care for these groups would be a major focus for Healthy People 2010 (Satcher, 2000).

This understanding requires better delineation of the obstacles to quality care and includes seeking timely care, care availability, socioeconomic status (SES) and financial barriers. The solutions to health disparity will likely be many and require a multifaceted understanding of health care delay that includes economic, behavioral, cultural, and historical factors. In addition, this understanding may differ, to some extent, by disease state and by ethnicity.

This study examined the utilization patterns and the quality of self-care among insured ethnic minorities and Caucasians with Type 2 diabetes. Arguably, health insurance coverage impacts access to care, however, other factors constitute barriers to utilization of care for African Americans, Hispanics and other ethnic minorities in the

United States. The subsequent review focuses on health care delay, insurance status and then addresses obstacles to quality self-care for Type 2 diabetes.

Understanding Ethnic Minorities and the Importance of Timely Care

Research over the past decade has continued to show that ethnic minorities suffer disproportionately from many chronic diseases. These diseases include cardiovascular disease, cancer, diabetes, and hypertension (Freimuth, 1990; Lewis, Belgrave, & Scott, 1990; Brown & Kahn, 1998; Suarez & Ramirez, 1999; Feldman & Fulwood, 1999). Not only are African-Americans and Hispanic Americans, more likely to suffer from these diseases, they are also at increased risk for complications and mortality from these illnesses in part due to their delayed access to the health care system (Jackson & Sellers, 1996). If medical care is sought, continuity of care is eluded because many times, ethnic minorities will use the emergency room for medical care services and usually the interaction in this environment is poor (Davis, Brown, Allen, Davis, & Waldron, 1995).

Forrest and Starfield (1998) examined the National Medical Expenditure Survey data (NMES) and found that expanding “after-hours” care (i.e., evening hours, weekend hours) increases access, utilization, and continuity of primary care services in a representative sample of the U.S. population. Research conducted over 3 decades ago by the Commission on Chronic Illness still holds true today. Approximately 40% of chronic disease, unnecessary suffering, and disability can be avoided by decreasing delays in diagnosis and treatment (Battistella, 1971). In addition, lack of access to ambulatory health care or a poor experience with that care can lead to unnecessary hospitalizations and more expensive forms and utilization of health care (Cornelius, 1997; Trevino, 1999).

Thus, not only is access to health care important but access to quality, timely, affordable health care is of greatest importance. Due to their delayed access, ethnic minority groups are as a result suffering unnecessarily from many preventable and treatable diseases. In order to further our understanding of delayed access in these groups, we must begin to elucidate and understand the numerous barriers they face as they access the complicated medical system.

Quality of Care

The United States is one of the wealthiest countries in the world and when one finally decides to seek care for a bodily symptom, it is expected that quality care will be received irrespective of financial status or ethnic/racial background. All patients want to receive high quality health care for their ailments. Nevertheless, often quality of care is related to financial standing and/or racial background (Watson, 1994; Trevino, 1999). Over the past 20 years, as health care has become more expensive and health management organizations (HMO) have taken over, quality of care has become increasingly important (Shi & Singh, 2000). There are a number of ways to measure quality of care. For example, quality can be measured in terms of type of experience the individual receives, the adherence by the medical community to evidence-based standards of care for each patient, the comprehensiveness of health care services available to the patient, or the type of health facility, to name a few. No matter how quality is measured, understanding the influence of quality of care on help seeking behavior becomes a vital research question.

Although quality of care is an important aspect of health care utilization for all patients seeking care, there has been evidence to show that there is disparity among

ethnic minorities and Caucasians in quality of health care services delivered and received. Thus, the disparity problem is in where ethnic minorities go for services and how they are treated when they arrive (Watson, 1994). In Watson's review of health care access among minority groups, he states, "not only do racial and ethnic disparities exist in medical services, but disparities also exist in medical treatment (pp. 128, Watson, 1994)." In fact, the recent report released by the Institute of Medicine (IOM; 2002) documented numerous studies demonstrating racial and ethnic disparities in the treatment for many different medical conditions (IOM, 2002).

Schneider, Zaslavsky, and Epstein (2002) recently examined the racial disparities in the quality of care delivered to individuals enrolled in Medicare managed care. The researchers used an employee database to examine four quality of care measures (breast cancer screening, eye exams for diabetics, beta-blocker use after myocardial infarction, and follow-up care after a mental health hospitalization). These measures are considered indicators of quality of care because they are preventive screens according to evidence-based standards of care criteria. These researchers found that on all four measures of quality care; African Americans received care that was lower in quality than their Caucasian counterparts.

Watson (1994) as well as the recent Institute of Medicine report (2002) offer a few factors that may be associated with health disparity in the quality of care received by ethnic minorities. These causes include: geography, culture and cultural insensitivity (e.g., racial stereotyping, mistrust), and institutional racism. Geography can be a deterrent to seeking health care in both the rural and urban environments. In the rural environment health care services may be sparse and located great distances from the

patient. In an urban environment, health care services may be located closer in distance, however transportation (i.e., buses, trains) may be a barrier to getting to the needed care on time.

Culture and cultural insensitivity may impede the health care seeking process. There may be a myriad of patient cultural factors such as language, home remedies, and alternative medicine practices that may delay care seeking. Also, physicians with different ethnic/racial backgrounds than their patients may not be aware of these cultural factors and/or practices. In addition, lack of physician cultural sensitivity, discrimination and racial stereotyping (i.e., all minorities are low income, all Hispanic patients do not want to speak English, etc.) greatly affect the care of the patient (IOM, 2002). It is important to note that the provider may not blatantly express this discrimination or stereotyping, but the patient may perceive this and discontinue their care, refuse treatment or even accessing the health care system at all (Sedlis et al., 1997). Survey research has shown this to be true and that minority patients perceive higher levels of discrimination than non-minorities in health care settings (LaVeist, Nickerson, & Bowie, 2000; Lillie-Blanton, Brodie, Rowland, Altman, & McIntosh, 2000).

Institutional racism is defined by Jones (1997) as “(1) the institutional extension of individual racist beliefs, consisting primarily of using and manipulating duly constituted institutions so as to maintain a racist advantage over others and (2) the byproduct of certain institutional practices that operate to restrict, on a racial basis, the choices, rights, mobility, and access of groups of individuals” (p. 14). In essence, it is more of a global policy of racism or discrimination implemented by a health care institution. Because institutional racism is a hard to measure construct and there may be

legal implications if racism or discrimination is documented, research on how institutional racism affects quality of care has been difficult to conduct.

Socioeconomic Status and Financial Barriers to Accessing Health Care

The primary explanation cited in the literature for delayed health care seeking has been financial barriers (Freimuth, 1990; Lewin-Epstein, 1991). Socioeconomic status (SES) and its relationship to health outcomes have been established (Adler, Boyce, Chesney, Folkman, & Syme, 1993; Adler & Ostrove, 1999; Lantz, House, Lepkowski, Williams, Mero & Chen, 1998; Williams, 1998). From the mid 1980's to the mid 1990's, much of the research in the area of health care access has focused on socioeconomic status (SES) as the main explanatory variable in the disparity of health utilization (Adler & Ostrove, 1999). Research has shown that race and SES are highly correlated (Williams, 1998). However, since measures of social class include education and income, and many minorities in the United States have lower socioeconomic status than Caucasians with regard to many measures of status, ethnic minorities are many times represented at the lower levels of the SES ladder (Anderson & Armstead, 1995). Williams (1998) described that African Americans have lower income levels, educational attainment, occupational status, and wealth. Similarly, Hispanic Americans are overrepresented in the inner cities of metropolitan areas and there is a large educational and income gap between Hispanics and Caucasians (Ginzberg, 1991; Suarez & Ramirez, 1999).

SES has been linked to many health behaviors and outcomes (Drury, Garcia, & Adesanya, 1999; Gold & Franks, 1990; Kahn, Kawachi, & Wise, 1999; Kraus, Borhani, & Franti, 1980; Taylor, 1999; Tyroler, 1989) and a graded relationship between SES and

health has been established (Adler & Ostrove, 1999; Ginzberg, 1991; Kraus et al., 1980; Tyroler, 1989; Young, 1999). Those lower on the SES ladder, experience poorer health and more complications than those individuals higher in SES (Anderson & Armstead, 1995). SES has been a strong predictor of morbidity and premature mortality (Adler et al., 1993). Also, ethnic minorities have felt that paying too much for medical services was a significant barrier to seeking care than Caucasians (Trevino, 1999) and cost was more of a barrier than race in their minds (Lillie-Blanton et al., 2000). Thus, the issue of socioeconomic status, race, and health becomes confounded.

Health Insurance in the United States

The Uninsured

In 2002, 43.6 million American adults were uninsured in the United States (U.S Census Bureau, 2003). Many of the concerns of this population include inadequate health insurance coverage with nearly 50% of the poor being uninsured (Addy, 1996; Shi & Singh, 2000), having inadequate health care facilities, and living in lower socioeconomic areas (Addy, 1996; Shi & Singh, 2000). By living in these lower SES areas, there are limited quality health services and this impacts utilization.

Other public health concerns include the uninsured are more likely to have poor preventive health care practices such as prenatal care, immunizations, dental and eye exams (Addy, 1996; Shi & Singh, 2000), and an increased use of emergency care services (Addy, 1996). Compared to insured individuals, the uninsured were 2 to 3 times more likely to report that they could not see a physician based on cost, did not see a physician despite needing care and that they did not receive preventive care (Baker, Shapiro, & Schur, 2000; Grumbach, 2000). Research has shown that the uninsured tend

to be poor, less educated and working part-time or in small companies (Shi & Singh, 2000).

The uninsured do not go completely without health care. The United States has a “back-up” or “fallback” system for those that truly destitute. Grumbach (2000) describes this “safety-net” system as a way for the current health care system to provide free or reduced fee care to the poor. This system includes public hospitals and community health centers as the primary sources of care for the disadvantaged. Also, private care physicians may sometimes treat the poor for a reduced fee. However, these sources of care are many times not accessed.

Due to the rising costs in the health care system, many more individuals are unable to afford to insure themselves and their families. There is a widening gap and many of the poor may work and many times are ineligible for health insurance for their health care (Shi, 2000; IOM, 2002). Managed care companies can afford to absorb the costs for the uninsured, however these companies will not absorb these costs and many community hospitals are closing due to financial instability. Grumbach (2000) argues that as the numbers of poor and uninsured increase the “safety-net” health system will be unable to bear the burden of providing health care to all of the uninsured.

Based on the relationship between race, SES and health, ethnic minorities are more likely to be uninsured. In 1998, the U.S. Census Bureau estimated that 35% of Hispanics, 22% of African Americans, 21% of Asian Americans, and 12% of Caucasians were uninsured (Shi & Singh, 2000). Based on these numbers, it is clear that ethnic minorities are more likely to lack health care (Ginzberg, 1991; Brown & Kahn, 1998;

Ribisl, Winkleby, Fortmann, & Flora, 1998; Shi & Singh, 2000; Suarez & Ramirez, 1999).

The Insured

As we know, there are many individuals that are uninsured, however, who are the insured? There are 187.4 million private insured, 35.2 million Medicare beneficiaries, and 31.5 million Medicaid recipients (Shi & Singh, 2000). For adults in the United States aged 18-64, approximately 70-80% are covered by private health insurance (Shi & Singh, 2000). Many of the individuals covered privately are through employee-based group health insurance programs. These benefits programs many times cover a percentage of the employee and their dependents health care costs. There are a growing number (approximately 13 million) of self-employed individuals that pay for 100% of their own private health insurance. These individuals include the family farmer, early retiree, and employee of a business that does not offer insurance (Shi & Singh, 2000).

Types of Insurance

Private Insurance. There are many different forms of private health insurance. As previously mentioned many of the insured in the United States have coverage through their employer. In addition, private health insurance can be defined in many different ways. For purposes of this research private health insurance was defined as health coverage by a private company (e.g., Kaiser Permanente, Blue Cross/Blue Shield) regardless of the payer (employer vs. self).

In addition, there are many different health insurance plans offered by managed care organizations. The consumer has a choice of over 1000 different health insurance companies/managed care organizations (Shi & Singh, 2000). The managed care

organization integrates the basic health care delivery functions, controls utilization by having the insured pay a nominal amount (i.e., co-pay) and by having the insured visit a “gatekeeper” (e.g., primary care provider) before being referred to a specialist. In addition, the managed care organization determines the price for health care services. The two main types of private health plans offered by these managed organizations: health maintenance organizations (HMO) and preferred provider programs (PPO). There are approximately 750 HMOs and 1,050 PPOs (Shi & Singh, 2000).

Public Insurance. The United States government has two main state and federally funded public insurance programs. These public insurance programs are Medicare and Medicaid and they both cover health care services (e.g., inpatient hospital stays, outpatient services, physician visits, nursing facilities, family planning, laboratory, x-ray, etc.) as well as dental care (i.e., both, medical and surgical) services for their participants (HHS, 2004). Medicare coverage is only available to individuals over the age of 65. In contrast, Medicaid is available to indigent individuals up to age 64 and others such as disabled, blind or medically needy individuals that meet the criteria for eligibility, which include income, asset, immigration and residency requirements. These government programs provide free or reduced fee care for their beneficiaries. In terms of Medicaid coverage for the same age group (18-64 years), 5-6% of Americans are covered by this public system. African Americans are more likely to be covered by Medicaid than their Caucasian counterparts (IOM, 2002). In addition, Hispanic Americans are also more likely to have public insurance compared to whites (IOM, 2002). Public health insurance in its current state will need to be expanded to target specifically vulnerable populations (Shi, 2000).

The Impact of Insurance on the Use of Health Care

Mueller, Patil, and Boilesen (1998) used the 1992 National Health Interview Survey (NHIS) to examine the role of insurance on utilization of rural residents. They hypothesized that proximity to health care provider may be a barrier to care. Rural residents or urban residents that have to travel long distance may not seek care. The authors hypothesized that urban whites would have the least barriers to care. Results indicated that insured persons were twice as likely to see a physician than the uninsured. Also, urban whites were more likely to use a physician's services than all other ethnicity-residence (urban vs. rural) subgroups. Finally, combining insurance status and race/residence lowered the odds of seeing a physician in the last year (e.g., being an ethnic minority and having no insurance greatly reduced the chance of seeing a physician).

In 1999, Powell-Griner, Bolen, and Bland examined data from the Behavioral Risk Factor Surveillance System (BRFSS), a national surveillance system, to determine the influence of health insurance coverage on the use of preventive care among individuals aged 55-64. Data from a sample of Americans interviewed by telephone were collected over a three-year period. Powell-Griner et al. found that among the approximate 50,000 respondents, those that were insured were more likely to report being in 'good,' 'very good,' or 'excellent' health (OR=1.3, 95%CI, 1.07, 1.48). Also, the insured had a usual source of medical care (OR=4.1, 95%CI, 3.06, 5.37) and were 7.6 times as likely to not have financial barriers to seeking care (OR=7.6, 95%CI, 6.46, 8.91). The uninsured were more likely to report that cost was a barrier to obtaining coverage and be in poorer health. Health insurance coverage was determined to be a good

predictor of preventive care service use (i.e., blood pressure & cholesterol checks and for women, breast exams & mammography) even when demographic variables (e.g., race, income, sex, education level, marital status) were controlled.

Hsia et al. (2000) conducted a large-scale study among older American women and the impact of having insurance on health care access. Hsia et al. (2000) surveyed over 55,000 women aged 50-79 across the country. Important questions of insurance payer, perceived health status and access to a usual source of care were asked. They found that having health insurance was the best predictor for having seen a physician in the last year. Also, the uninsured were more likely to have poorer perceived health status. Hsia and colleagues also found that insurance status differed by race with African American and Hispanic American women with a lower household income, education, who were unmarried and unemployed, were less likely to have insurance.

Kasper, Giovanni and Hoffman (2000) used longitudinal data to determine the impact of gaining versus losing health insurance coverage on access to care and health outcomes. These researchers compared both Medicaid and the privately insured versus the uninsured and those losing coverage over a 2-year period using the Kaiser Survey of Family Health Experience (K-SOFHE) data. They found that the uninsured were more likely to not have a usual source of care or to have seen a physician in the last year. Also, the uninsured were more likely to have difficulty trying to obtain medical care once they lost coverage. However, those uninsured individuals that did gain health insurance coverage had increased access to medical services compared to those that remain uninsured. In terms of health status, there were trends in the data that suggested that individuals losing coverage might experience adverse health outcomes compared to those

that remained covered. The previous research demonstrates that having health insurance increases access to care and possibly improves health status.

Access to Care vs. Utilization of Care

The terms “access” and “utilization” are two terms that are many times used synonymously in the literature. Many times these words are confused and access to care implies utilization. However, much of the research has demonstrated that access to care does not mean “use” of that care. Based on the insurance systems in the U.S. (i.e., private, public, “safety-net” care), technically, everyone has “access” to some form of healthcare. However, “access” can be divided into two distinct concepts: physical access and psychological access. Physical access can be described in terms of location of a health care facility as well as hours of operation of that facility. Psychological access can be described as the cognitive and affective processes whereby the person feels as if the health care facility is either for them or not for them (i.e., they anticipate a negative experience). Research has also shown that ethnic minorities “perceive” higher levels of racial discrimination in health care settings (LaVeist, Nickerson, & Bowie, 2000; Lillie-Blanton et al., 2000).

Disparities among the Insured

Does having health insurance guarantee equity of access, utilization, quality of care? This research question has been examined by a number of different researchers over the past decade. With disparity research becoming a national priority, having insurance should equal comparable care among all Americans. Research has been conducted examining the impact of having insurance on many different health outcomes. And, disparities continue to exist among the insured.

In terms of access and the impact of insurance status, Reschovsky (1999) studied the difference in accessibility of health care between HMO and non-HMO enrollees. Access was defined across four dimensions: unmet/delayed care needs, financial barriers, restricted provider access and convenience of care. Results indicated that after controlling for population (e.g., race, income, age and health) and location differences, HMO and non-HMO patients did not differ in their reports of unmet/delayed care needs. However, type of insurance affected health care access, with HMO enrollees having lower financial barriers to care. Also, HMO patients were more likely to have a usual source of care.

Padgett, Patrick, Burns, and Schelesinger (1994) examined differences in outpatient mental health service use among ethnic minority and Caucasian women with comparable levels of insurance. The researchers analyzed a federal database of women insured by Blue Cross/Blue Shield. After controlling for age, education, family size, region, ethnic percentage in county, individual annual medical expenses, family medical expenses, familial inpatient mental health service use, and the sum of all familial outpatient mental health visits, results revealed disparities in health service utilization. Overall, Black and Hispanic women were less likely to use the outpatient mental health services despite having the same insurance coverage. However, there was a race by region interaction with Black women in the western states using more care and Hispanic and Caucasian women in the eastern region having higher use. Also, as education level of all women increased, utilization also increased. It is important to note that there were a number of limitations of this study including: nature and severity of mental health problem, lack of information on the influence of culture (e.g., all Hispanics grouped

together vs. differences between Puerto Ricans, Mexican Americans, etc.), and information on marital status.

Carlisle, Leake, and Shapiro (1997) also examined disparities in the use of cardiovascular procedures (e.g., coronary arteriography, coronary artery bypass graft surgery or coronary artery angioplasty) among ethnic minorities and Caucasians with insurance coverage. Carlisle et al. examined hospital discharge records of California residents with possible coronary artery disease. After controlling for primary diagnosis, age, gender, co-morbidities, admission type, and hospital procedure volume, they found that Caucasians were more likely to have Medicare or private health insurance. However, ethnic minorities (i.e., African Americans, Asian Americans, and Latinos) were more likely not to have health insurance or to have Medicaid. In terms of invasive procedures conducted in coronary disease, African Americans and Hispanic Americans were less likely to receive these procedures. Despite insurance category, Asian Americans were at least as likely to have the same procedures as Caucasians. Finally, there was a race by insurance category interaction with African Americans in the Medicaid category receiving fewer medical procedures than any other group and both uninsured African Americans and Latinos being more likely not to receive any of the procedures as compared to uninsured Caucasians. The authors concluded that possible bias in clinical decision-making may be related to the disparities in the procedures.

Disparity among the different types of health insurance and preventive health services has also been found. Weinick & Beauregard (1997) examined data on use of prevention services among women. The data demonstrated that HMO enrollees had an advantage over fee-for-service enrollees. Those enrolled in an HMO were more likely to

have received a Pap smear, breast exams and mammograms. Having to receive a referral for other health services did not pose a barrier to receiving preventive care. The authors suggest that fee-for-service insurance plans should increase the preventive services offered to women.

Research was also conducted to examine the effect of health insurance and race on the early detection of cancer. Roetzheim, Pal, Tennant, Voti, Ayanian, Schwabe, and Krischer (1999) extracted data from the Florida Cancer Data System (FCDS) and the Florida Agency for Health Care Administration. They examined the data by race and insurance status and found that there was a relationship between insurance status and early detection of cancer. Individuals with Medicaid were more likely to be diagnosed with a later stage of breast cancer or melanoma. Also, African Americans were more likely to have a later stage diagnosis than Caucasians. There was no interaction between race and insurance status in this sample. Roetzheim et al. suggest that there need to be increased efforts to improve access to cancer screening services in these populations.

Roetzheim, Pal, Gonzalez, Ferrante, Van Durme and Krischer (2000) conducted a research study on colorectal cancer treatments and outcomes. The Roetzheim group studied the effects of race and health insurance on colorectal cancer. Using the FCDS data, the researchers found that insurance type had an effect on types of treatments received. Also, type of private health insurance was associated with a higher adjusted risk of death (e.g., commercial HMO patients had a higher risk of death than fee for service patients). There were no differences in the surgical treatment and radiation therapy of colorectal cancer patients by race. However, African Americans had a higher overall mortality rate in all models than Caucasians after stage of diagnosis was

controlled. Also, Hispanic Americans were less likely to receive chemotherapy than their Caucasian counterparts. The authors conclude that, despite the limitations of using an administrative database, significant difference between race and insurance coverage were found. They suggest that more research needs to be conducted to understand the mechanisms operating to cause this disparity.

Quality of care was also examined in relation to health insurance status. Shi (2000) conducted research on the quality of the primary care experience among different types of insured patients. The quality of care received by the patient was operationalized as comprehensiveness (e.g., preventive care also received), first contact (e.g., usual source of care, type of health professional, etc.), longitudinality (e.g., continuity of care, satisfaction with care), and coordination (of health care). Shi (2000) found several interesting findings. First, the overall quality of the primary care experience is directly related to insurance status. Also, the insured receive better primary care services than the uninsured and concomitantly the privately insured receive better service than the publicly insured. Finally, those with fee for service insurance plans experience better longitudinal care and have fewer barriers to care than HMO insured patients.

All of the previous research clearly demonstrates a number of salient points. First of all, utilization matters. Despite having comparable private coverage African American and Hispanic Americans may utilize less health services. Secondly, region matters. There is an effect of region on use among groups. Type of coverage (e.g., public vs. private) matters. The publicly insured receive less quality care than the privately insured and there seems to be a relationship among the type of private insurance and care

received. Finally, race matters and racial disparities still exist among comparably insured individuals.

Ethnic Minorities and Delayed Care Seeking

We know overall the reasons most patients delay seeking care irrespective of race and ethnicity based on Safer and colleagues' work (Safer, Tharps, Jackson, & Leventhal, 1979). However, why specifically do ethnic minorities delay seeking care? The current attitudes and health behaviors of ethnic minorities have been influenced historically by different experiences and access to health care services. Differences in beliefs and the impact of these beliefs on health care seeking practices are beginning to be studied by researchers. In fact, several studies have examined specific health beliefs of African Americans. This line of research may begin to lead to reasons why delayed health care still exists among these groups.

Bailey (1987) examined qualitatively the sociocultural factors impacting health care seeking behavior among African Americans. He interviewed 203 African American attendees of a local urban health care clinic and found that there was a specific pattern associated with delayed access among African Americans. He defined distinct stages characterizing this pattern: illness appears, individual waits for a certain period, individual allows body to heal itself (through prayer and meditation), individual evaluates daily activities, individual seeks advice from a family member or friend, individual accesses the medical care professional. Also, the author noticed that African Americans relied on the use of self-care for many of their symptoms.

Ell, Haywood, Sobel, deGuzman, Blumfield, and Ning (1994) examined factors associated with delayed emergency room care for acute chest pain in African Americans.

In order to obtain information about cardiac symptoms, 448 structured interviews with African Americans from public and private hospitals were conducted. The researchers found that increased delay time was associated with limited structural access to care, persistence of symptoms, degree of incapacitation, consultation with a layperson, mode of transportation, and consultation with a medical professional. Many of the decisions to seek care for cardiac symptoms among these African American patients were similar to Bailey's (1987) cultural patterns.

Raczynski, Taylor, Cutter, Hardin, Rappaport, and Oberman (1994) also explored reasons for delay among African Americans and Caucasian patients with coronary heart disease symptoms. Approximately 2,400 inpatients with diagnoses of coronary artery disease, ischemic heart disease, or myocardial infarction, were administered a structured interview to obtain information regarding their health care beliefs (particularly symptom recognition and attribution). They found that African Americans were more likely than Caucasians to attribute cardiac symptoms to non-cardiac events (i.e., heartburn, indigestion). Also, African American patients reported fewer painful symptoms. The authors conclude that this finding may suggest that African Americans may not be as aware of the warning signs and symptoms of heart attacks.

Vaughn (2001) conducted a study examining the differences in health care seeking behaviors among enlisted military personnel. Knowledge of cancer and diabetes warning symptoms was assessed and vignettes with warning symptoms for many typical health symptoms were used to examine the "typical/usual" care seeking behaviors (e.g., "what would you most likely do if you experienced acute back pain?") among ethnic minorities and Caucasians with equal access to quality health care. The major findings of

this study were that there were no differences in knowledge of cancer and diabetes symptoms among the racial groups. However, differences in health care seeking behavior was found, with ethnic minorities delaying care for many chronic illness warning signs such as experiencing blurry vision or loss of peripheral vision. In contrast, ethnic minorities did not delay seeking care for acute symptoms of pain (i.e. sharp lower back pain). Interestingly, as pain or symptoms persisted minorities were more likely to delay their care. Finally, African Americans, in particular, were more likely to ignore depressive symptoms.

Overall, African Americans seem to be more likely than Caucasians to delay seeking health care services for different medical symptoms. Researchers have recognized delayed care seeking behavior among this group as a problem in disease progression as well as primary prevention. However, few researchers to date have empirically examined the factors accounting for delayed care seeking among many African Americans.

One approach to examine these factors is to focus on a specific disease state and health behaviors. This proposal focuses on diabetes, one of the many chronic diseases that disproportionately affects ethnic minorities. Williams (1997) proposes that ethnicity may have an independent effect on health care seeking regardless of SES. And, work by Bailey (1987) has begun to elucidate many of the factors that African Americans indicate as reasons for their delay in seeking health care. It is important to note that sample selection and sample characteristics are critical to assessing health care access as all African Americans may not behave the same (Sbrocco et al., 1999). A true population based investigation would help address this problem.

Problem of Type 2 Diabetes

Over the past decade, the burden of diabetes has increased dramatically in both genders, all ages, ethnic groups, education levels and in many states (Mokdad, Ford, Bowman, Nelson, Engelgau, Vinicor, & Marks, 2000). In the United States, the increased prevalence and incidence of the disease has been associated with the increase in obesity and the decrease in physical activity. Currently, there are 18.2 million people with diabetes in the United States (ADA, 2004). Also, research has continued to show that the incidence of individuals with diagnosed (i.e., 13 million) and undiagnosed (5.2 million) diabetes has increased and will continue to increase (Boyle, et al., 2001).

Ethnic minorities and Type 2 Diabetes

Consequently, as the numbers of new and old cases increase in the general population, minority groups are greatly affected. Diabetes is most prevalent in minority populations (Harris, 1998). The American Diabetes Association (ADA) reports that approximately 2.7 million or 11.4% of all African Americans and 2 million Hispanics (8.2%) have diabetes (ADA, 2004).

In addition, African Americans and Hispanics are approximately 2 times more likely to have diabetes, than Non-Hispanic Whites (ADA, 2004). African Americans and Hispanics are also more likely to have a 50-100% higher burden of illness and experience major complications from diabetes than other ethnic and racial groups (ADA, 1999, IOM, 2002). African American diabetic patients were more likely to use the emergency room for care and had fewer physicians visits than Caucasians (Chin, Zhang, & Merrell, 1998). Based on the increased prevalence and incidence of diabetes in the minority groups of the U.S., diabetes related morbidity and mortality also increase in these groups. In fact,

Mexican Americans are 4.5 to 6.6 times more likely to suffer from end stage renal disease than any other group (ADA, 1999).

The Economic Impact of Diabetes

Based on the numerous complications associated with uncontrolled diabetes (e.g. hypertension, dyslipidemia, cardiovascular disease, etc.), the costs for treating these complications are extremely high. The global costs of diabetes are approximately 2-3% of the total health care costs in every country (Jonsson, 1998). Also, the economic impact of diabetes is influenced by the overall economic development of the health care system in the country. Jonsson also reported that the cost of the disease is directly related with the age of diagnosis, with undiagnosed or late diagnosed diabetes being associated with greater of complications (e.g. retinopathy, nephropathy, cardiovascular disease) which in turn lead to higher treatment costs. Clark (1998) reported that data from the ADA indicates that diabetes is associated with higher rates of hospitalizations as well as a higher incidence of angina, renal failure, blindness, myocardial infarction and non-traumatic amputations. Finally, over 160,000 people per year die from diabetes related complications in the United States (Jonsson, 1998).

Research conducted by Selby, Ray, Zhang, and Colby (1997) examined the excess cost of medical care associated with diabetic patients specifically in a managed care organization in the United States. Selby and colleagues compared the medical costs of diabetics versus non-diabetic control subjects over a one-year period. They found that individuals with diabetes incur over \$3,494 per year more than the control subjects. This is more than 2.4 times the cost of a matched control subject and this amounts to an excess of \$282.7 million a year (Selby et al., 1997). Also, approximately \$1 of every \$6 health

care dollars is spent on diabetes. Much of the excess cost was associated with more inpatient care, prescriptions, office-based follow-up care and individuals over the age of 45. Mokdad et al. (2000) reported that in 1997, the total health costs associated with diabetes exceeded an estimated \$98 billion. These researchers have shown in a one-year period the high costs associated with this illness, thus prevention, early detection and continuous comprehensive treatment is important.

Direct treatment costs associated with diabetes have also been calculated. Herman and Eastman (1998) reported the direct costs associated with intensive treatment of both Type 1 and Type 2 diabetes. The authors determined that for diabetes treatment, actual treatment costs for intensive therapy were greater than conventional therapy, but that the potential savings from preventing and/or delaying long-term complications outweighs the costs (Herman & Eastman, 1998). With respect to Type 2 diabetes specifically, the researchers used complex economic modeling systems to determine the financial cost savings. The model predicted that intensive treatment for Type 2 diabetics resulted in increased survival and quality of life. Although the comprehensive therapy for Type 2 patients cost approximately \$40,000 more than the standard therapy, the difference was offset by the reduction in lifetime complications (Herman & Eastman, 1998). Furthermore, when the total lifetime costs of treatment for Type 2 diabetics was calculated, the amounts were comparable for both standard and intensive treatment (\$100,000 and \$120,000, respectively; Herman & Eastman, 1998).

What is Type 2 Diabetes?

Diabetes is a disease of the endocrine system that is characterized by an increase of plasma glucose concentrations. Diabetes is diagnosed if an individual's fasting plasma

glucose concentration is greater than or equal to 126 mg/dL or a random glucose of greater than or equal to 200 mg/dL. There are two main pathophysiologic defects that cause an increase in plasma glucose levels to occur: impaired insulin secretion and insulin resistance. Glucose acts as fuel for the cells of the body and is broken down from carbohydrates that are ingested as food. An increase in plasma glucose (hyperglycemia) postprandial causes insulin to be released. Insulin then binds to the outer membrane of the cell and activates the cell so that glucose can enter the cell membrane. Type 1 diabetes (which represents only 10% of all cases of diabetes in the U.S. and is not disproportionately increased among African Americans) is characterized by an absolute deficiency of insulin secretion by the islet cells of the pancreas due to autoimmune destruction (Williams & Pickup, 2001). This is quite different than the cause of Type 2 diabetes which is not autoimmune and occurs one of two ways: (1) If there is a relative impairment of insulin secretion, plasma glucose levels will rise because it will not be able to enter the cell. (2) Insulin resistance refers to the process whereby the target cells for insulin (muscle, liver, and fat) have a reduced insulin sensitivity, i.e. for a given amount of insulin, blood sugar is reduced less than expected. Also, the process that creates the precursor to insulin (proinsulin) is impaired leading to an oversecretion of proinsulin and its byproducts (Williams & Pickup, 2001).

Diabetic Complications

Over the long-term an increased amount of glucose in the bloodstream can lead to cellular damage and many of the diabetes related complications (e.g., retinopathy, nephropathy, and neuropathy). Research has shown that diabetic patients under poor control have a higher frequency of microvascular complications and as the duration of

diabetes increases, the prevalence of retinopathy, nephropathy, and neuropathy increases (Pirat, 1978 as cited in Williams & Pickup, 2001).

Retinopathy is the diabetic eye disease that is associated with poor control of diabetes. Due to the high levels of glucose in the bloodstream, retinal blood vessels become damaged and a progressive stage of vision loss is experienced. The first stage of retinopathy is associated with the retinal vessels becoming thick. As the retinal vessels become damaged, the body misinterprets the response and there is increased blood flow in the retinal area to produce more blood vessels. These tiny blood vessels cannot adjust to this increased blood flow and begin to rupture. Also, other retinal vessels are becoming ischemic. The ischemia causes growth factors to be released and more vessels grow on the surface and overlie the retinal vessels. This progressive state can lead to a slow onset blindness in uncontrolled diabetic patients (Williams & Pickup, 2001).

Blurred vision is a common symptom that may drive individuals in to see a physician. However, Vaughn (2001) found that despite having access to care, African American and Hispanic Americans were more likely to delay care if they experienced blurry vision. A limitation of this study is that is unknown in this sample of otherwise healthy military males if the blurry vision they are assuming is the same type and/or intensity of “blurry vision” associated with retinopathy.

Nephropathy is associated with kidney damage at the glomerular level. The glomerular membrane is affected by the increasing capillary pressure between the membranes and the loss of negative charge. The membrane eventually becomes more porous as the pores enlarge and more protein (albumin) escapes in the urine (e.g., condition is called micro- or macroalbuminuria depending on the severity of protein

loss). The worsening of this condition can lead to proteinuria which in turn leads to end-stage renal failure and ultimately kidney dialysis or death for the diabetic patient (Williams & Pickup, 2001).

Neuropathy encompasses a number of diabetic related syndromes. The syndromes fall in the categories of distal symmetrical neuropathies and mononeuropathies. Distal symmetrical neuropathy symptoms include numbness, numbness, altered sensations (e.g., paraesthesias and allodynia), and pain. These symptoms usually occur in the feet, but the hands or other limbs may be affected. Particularly with the feet, sensation becomes lost and a microscopic ulceration can become infected without the patient's knowledge and the worsening infection can lead to a non-traumatic amputation. Mononeuropathy affects a single nerve and its root, but many times this condition can be alleviated (Williams & Pickup, 2001).

Finally, due to the numerous micro- and macrovascular complication among diabetic patients, there are a number of cardiovascular problems that usually arise. Type 2 diabetics have a two- to fourfold increased risk of cardiovascular disease compared to non-diabetic individuals (Goldbourt, Yaari, & Medalie, 1993; Stamler, Vaccaro, Neaton, & Wentworth, 1993). There is a high incidence of myocardial infarction and strokes among diabetics which, in the end, often causes premature death. There have been a number of studies indicating the increased risk of cardiovascular morbidity and mortality among diabetic patients. Specifically, Coutinho, Gerstein, Wang, and Yusuf (1999) conducted a meta-regression analysis of the relationship between glucose and the incidence of cardiovascular events. The researchers reexamined data from 20 studies, which included over 95,000 individuals with glucose measurements. They found a direct

positive relationship between initial fasting glucose and postprandial glucose and the occurrence of a cardiovascular event within a 12-year period. In addition, subclinical glucose levels were found to increase the risk of an event.

With respect to cardiovascular mortality data associated with diabetes, Bjornholt and colleagues (1999) conducted a 22-year longitudinal study of approximately 2000 non-diabetic males to examine cardiovascular mortality. They found that 53% of otherwise healthy men with subclinical levels of glucose tolerance (i.e., fasting glucose <110 mg/dL) had died due to cardiovascular disease. The authors concluded that fasting glucose levels in the upper normal range may be predictor of cardiovascular death in non-diabetic men. In addition, Saydah, Loria, Eberhardt, and Brancati (2001), after examining data from the 2nd NHANES mortality study, found that there was a 15-54% greater risk for cardiovascular mortality among individuals with impaired glucose intolerance. In addition, Khaw and colleagues (2001) found that among men, an increased in A1c (the generally recognized term for glycohemoglobin; A1c is the measure of glycemic control over the previous 2-3 months) was directly related to all causes, cardiovascular, and ischemic heart disease mortality (Khaw et al., 2001). They also found that a 1% A1c increase was associated with a 28% increase in risk of death.

How can it be prevented?

Type 2 Diabetes can be prevented in a number of ways. It has been demonstrated in the literature that the prevalence of diabetes is highly correlated with the prevalence of obesity (Mokdad et al., 2000). With over 80% of Type 2 diabetics being obese, truncal obesity in particular is associated with Type 2. Due to the fact that visceral fat (truncal)

is more metabolically inactive than peripheral fat and it releases non-estrified fatty acids (NEFAs) which cause insulin resistance (Williams and Pickup, 2001).

The Diabetes Prevention Program (DPP) research group conducted a 3-year randomized control study to examine the effects of diet and lifestyle modifications or medication (i.e., metformin) on the incidence of Type 2 diabetes among patients at risk for the disease (i.e., patients with an impaired glucose tolerance; DPP, 2002). There were 3,234 persons at high risk for Type 2 diabetes in this study. Participants were randomized to one of three conditions: standard lifestyle recommendations plus placebo twice a day, standard lifestyle recommendations plus medication twice a day, or intensive lifestyle program intervention. The medication used was an 850mg dosage of metformin (e.g., Glucophage). The standard lifestyle recommendation included written information and a 20-30 minute in person individual session about healthy lifestyles. The intensive lifestyle intervention program included maintaining at least a 7% weight loss of initial body weight through a healthy low-calorie and low-fat diet, engaging in 150 minutes of a moderate physical activity (e.g., brisk walking) per week and completing a 16-lesson one-on-one curriculum with a case manager on diet, exercise and behavior modification (DPP, 2002).

Results from DPP (2002) indicated that participants in the intensive lifestyle intervention loss more weight (i.e., both at the end of the 24-week curriculum and at the most recent follow-up visit) and had a greater increase in physical activity than individuals in the placebo and medication groups up to 2½ years later. Also, the incidence of Type 2 diabetes was 31% lower in the medication group and 58% lower intensive lifestyle group as compared to the placebo group. Finally, the overall mean

fasting plasma glucose was less in the medication and lifestyle groups. DPP demonstrated that Type 2 diabetes can be “prevented or delayed in persons that are at high risk for the disease.” The results were similar across both sexes and in all racial and ethnic groups. In addition, lifestyle modifications were more effective than medications (DPP, 2002).

How Can it be Treated?

Type 2 Diabetes can be treated with a number of oral and injection medications. The medications that can be used to reduce fasting plasma glucose concentrations fall into seven main treatment classes: sulfonylurea, non-sulphonylurea secretagogues, biguanides, alpha-glucose inhibitors, thiazolidinediones, insulin, and combination therapy (Williams & Pickup, 2001). Each medication works by a different mechanism of action.

Standards of Care for Diabetes

The Diabetes Control and Complications Trial research group (DCCT) conducted a multi-center randomized clinical trial on the effect of intensive treatment on the development and progression of long-term complications in Type 1 diabetics (DCCT, 1993). The research group randomized 1,441 patients from 1983 through 1989 to either the conventional therapy or intensive therapy groups. For this study, the conventional therapy consisted of 1-2 insulin injections per day and the intensive therapy consisted of 3 or more daily injections or an insulin pump to try to achieve normoglycemia. The patients were followed over an average of 6.5 years. The purpose of the study was to determine if intensive therapy would prevent the development of diabetic retinopathy in patients with no retinopathy and if intensive therapy would slow the progression of

retinopathy in patients with early signs of retinopathy (DCCT, 1993). Renal, neurologic, cardiovascular, and neuropsychological outcomes were also examined in both groups.

All patients in this study were insulin dependent and the age range for this sample was 13-39 years. Results from DCCT indicated that in patients with an absence of retinopathy, intensive therapy reduced their adjusted mean risk of development of the eye disease by 76% (95% CI 62-85 percent) compared to the conventional therapy group. In addition in the group of patients with early signs of retinopathy, intensive therapy slowed the progression of the eye disease by 54% (95% CI 39-66 percent) compared to the conventional group. Also, in both groups (i.e., patients without and with early signs of retinopathy), the intensive therapy treatment reduced the occurrence of microalbuminuria by 39% (95% CI 21-52 percent) and clinical neuropathy by 60% (95% CI 38-74 percent). The DCCT research group successfully demonstrated that intensive therapy in insulin dependent patients effectively delays the onset and slows the progression of diabetic retinopathy, nephropathy, and neuropathy (DCCT, 1993).

Another landmark randomized control study was conducted in the United Kingdom starting in 1977 and the results of this 20-year study had a direct impact on the standards of care for Type 2 diabetics. The United Kingdom Prospective Diabetes Study (UKPDS) Group examined the impact of intensive therapy versus the standard diabetes treatment on diabetes related complications (UKPDS, reported 1998). Approximately 5,000 newly diagnosed type 2 diabetics were included in this study. The ages for this sample ranged from 25-65 years and over 94% of the sample had a plasma glucose concentrations ≥ 126 mg/dl. UKPDS was designed to test four levels of treatment: conventional policy with initial diet therapy, intensive therapy with sulfonylureas,

intensive therapy with insulin, and intensive therapy with metformin. The difference between the conventional and intensive therapy was in the aims. For conventional therapy, the aim was a fasting plasma glucose (FPG) below 15 mmol/L without hyperglycemic symptoms and for intensive therapy, the aim was a FPG less than 6 mmol/L. If the individuals in intensive therapy group had $FPG > 6$ mmol/L, a letter was sent from the coordination center with advice on ways to change their treatment. All administered medications were prescribed by a physician and the dosage was based on the individual's level of obesity and fasting plasma glucose levels. Results indicated that there was slight weight gain among individuals on sulfonylurea or insulin medications. Patients on the diet therapy alone gained less weight whereas the metformin patients were able to maintain their weight over the 9-year treatment period. However, overall, in the short-term, data from UKPDS demonstrated that intensive glycemic control with any of the medications was effective in reducing fasting plasma glucose concentrations and over the long-term reductions in diabetic related complications were also demonstrated by tight glycemic control.

The results from DCCT and UKPDS, and the subsequent studies conducted with these landmark datasets, have been the basis for the standards of care developed for diabetic patients. There are a number of professional and medical organizations that have distributed the standards of care for treatment of diabetes. Two organizations that have been at the forefront of creating and disseminating quality care standards are the American Diabetes Association (ADA) and the American Association of Clinical Endocrinologists (AACE). These two organizations have used evidenced-based research

results in guiding the treatment guidelines for diabetic patients (e.g., DCCT, 1993; UKPDS, 1998).

The ADA is a national public organization dedicated to the cause of prevention and treatment of diabetes. A set of standard practices for treatment of diabetes was originally approved in 1988 and subsequently revised in 1994, 1996, and 1997 (ADA, 1998). The goal of the treatment of diabetes is aimed at lowering blood glucose to or near normal levels in all patients (ADA, 1998). Based on the previously presented research data it has been clearly demonstrated that tight glycemic control reduces macrovascular and microvascular complications in the short and long term. The guidelines of the ADA (1998) stipulate that all diabetic patients frequently self-monitor blood glucose, follow medical nutrition therapy prescription, exercise regularly, and adhere to prescribed medications. Specifically, the ADA has targeted treatment guidelines for physicians of Type 2 diabetic patients. These guidelines include a complete medical history, physical examination (which includes body mass index assessment, blood pressure, ophthalmoscopic, oral, thyroid, cardiac, abdominal, extremity, skin, and neurological exams), laboratory evaluations (which include fasting plasma glucose levels, fasting lipid profiles, A1c, urinalysis, electrocardiogram, serum creatinine, and thyroid function tests), and a detailed management plan (which include recommendations for lifestyle changes (i.e. smoking cessation, exercise), annual eye exam, patient & family education of self-management by a Certified Diabetes educator, statement of short & long term goals, individualized nutrition assessment and medication management; ADA, 1998).

AACE is a national association of clinical endocrinologists. The AACE developed in 1994 an initial set of guidelines for patients and physicians in the care of diabetes. There have been subsequent revisions of the guidelines that have incorporated the latest research for improving the health of these patients. The AACE guidelines state that the physician should help guide the patient in their own self-management of their disease (AACE, 2000).

Burden of Diabetes from the Patient's View

The AACE guidelines advocate for patients to be able to manage a diverse body of health professionals, which include (but are not limited to) an endocrinologist, ophthalmologist, podiatrist, nutritionist, nephrologist, cardiologist, and pharmacist. The patient must know the role of each of these health professionals in order to avoid or ameliorate the effects of diabetes related micro- and macrovascular complications. In addition the patient must monitor their blood glucose daily, exercise, eat right, and administer their medications. This is an enormous responsibility for the patient to negotiate through (See chart below; AACE, 2000) and adherence among this patient population has historically been difficult.

Summary of Patient and Physician Responsibilities in Intensive Diabetes Self-Management System (AACE, 2000)

<u>Patient Responsibilities</u>	<u>Physician Responsibilities</u>
Monitoring of blood glucose	Adherence to a system of intensive self-management of diabetes
Exercise program	Measurement of outcomes
Adherence to dietary guidelines	Determination of patient satisfaction
Blood pressure monitoring	Maintenance of communication with team
Smoking cessation	Development of evaluation programs; include safety in taking medications and identification of patient misconceptions

<u>Patient Responsibilities</u>	<u>Physician Responsibilities</u>
Consistent use of aspirin	Listening to patient concerns
Overcoming psychological and other barriers	Establishing and maintaining follow-up schedule
Healthy expression of feelings	Documentation of patient care
Foot and eye care	Supervision of the patient's diabetes education
Understanding "targets" for control of blood glucose and blood pressure	Encouragement of patient in use of preventive measures and risk reduction
Communication with physician and diabetes care team	Supervision of proper foot care procedures
Keeping appointments	
Record keeping	
Adherence to medication regimen	
Evaluation of physician and diabetes care team	
Treating and modifying "targets" in collaboration with physician	
Knowledge of personal glycosylated hemoglobin value and its meaning	

Oral Health and Diabetes

Diabetic patients are recommended to maintain "good" oral hygiene that includes bi-annual dental exams (i.e., at a minimum). Uncontrolled diabetic patients are at increased risk for a number of oral complications including: xerostomia (dry mouth), infection, periapical abscesses, poor healing, periodontal disease, candidiasis, gingivitis, burning mouth syndrome as well as increased incidence and severity of caries (Vernillo, 2001). These diseases and complications are related to the excessive loss of fluids through polyuria, microvascular changes and increases in glucose concentrations in the saliva (Little, Falace, Miller, & Rhodus, 1997). Thus, bi-annual dental exams are strongly recommended.

Specifically, work by Sandberg, Sundberg, Fjellstrom, & Wikblad (2000) found that Type 2 diabetic patients suffered more from dry mouth and periodontitis than matched controls. They also found that as time with diabetes increased, individuals had

more caries. The authors concluded that there should be a close collaboration among the patient, the primary care physician and the oral health professional.

Quality of Care for Diabetes

As previously stated, there are a number of different ways that quality of care can be measured. Primarily in diabetes research, quality of care is associated with adherence with standards of care established by evidence-based research. The Diabetes Quality Improvement Project (DQIP) was created by a panel of experts from the following organizations: American Diabetes Association (ADA), the Centers for Medicare and Medicaid Services (CMS), and the National Committee for Quality Assurance (NCQA; DQIP, 2003). The goal of DQIP was to create a set of diabetic measures for physicians to use in order to improve the quality of care delivered to patients. The set of measures was developed based on the underutilization of preventive services (i.e., eye exams, foot exams, blood glucose control, blood pressure and cholesterol monitoring) from HMO settings (DQIP, 2003). Data from DCCT have unequivocally demonstrated that optimum management of blood sugar levels, complications, as well as prevention focused care such as eye, dental, and foot exams reduces complications from diabetes and constitutes ideal care for the patient (DCCT, 1993). However, use of preventive care practices among diabetic patients remains at “less than desired levels” (CDC, 2002).

Specifically, Martin, Zhang, and Selby (1995) examined physician and patient prevention practices, complications and risk factors among approximately 400 Type 2 diabetic patients (over 45 years old) enrolled in an HMO. Martin and colleagues used patient medical charts and prescription history for their sample. Surprisingly, they found that there were no differences between racial groups in adherence to prevention practices.

Specifically, the patients completed 5 of 8 prevention guidelines. Also, there were no racial differences in the types and number of physician referrals among the patients.

Limitations of the study include the inability of the researchers to assess the impact of language barriers on the care based on the small numbers of non-English speakers in the sample. Also, only specific individuals (over age 45, with a diabetes diagnosis over 7 years) were used, thus limiting the generalizability of the results.

Ethnic Minorities, Type 2 Diabetes and Health Insurance Status

Research in the area of ethnic minorities with diabetes and the impact of health insurance status has been scant over the past 40 years. Researchers are beginning to understand the important relationship between health insurance status and minority status as related to health. Recently, there have been a few studies to examine this relationship. Harris (1999) examined racial and ethnic differences in health insurance coverage among diabetic adults. Harris used the Third National Health and Nutrition Examination Survey (NHANES) data to examine the percentage of diabetic ethnic minorities with health insurance. Data showed that of all individuals with diabetes irrespective of racial background, 93% have some form of health insurance and many (52%) had multiple sources of coverage. However, approximately 23% of diabetic Mexican Americans did not have health coverage. Harris also found that race as well as age predicted health insurance coverage among diabetics. Specifically, among individuals between 20-64 years, Caucasians (91%) and African Americans (89%) were more likely to have coverage than Mexican Americans (66%). Interestingly among this same age group, race was a factor among type of health coverage with black men and women more likely to have Medicare (public health insurance) versus whites being covered primarily by private

health insurance companies. Harris (1999) concludes that an unanswered question remains: does the sources and nature of health insurance influence health outcomes among diabetic patients? In order to further understand the impact of race/ethnicity on health care utilization and quality, examining individuals with Type 2 diabetes that have health insurance is a next step.

Specific Aims

The purpose of this project was to examine the association of ethnicity with health care utilization and quality of self-care among insured adults with Type 2 diabetes. For purposes of this study healthcare access was implied by insurance status. Thus, regardless of the type of insurance (e.g., private vs. public), access to care was assumed.

Given the extensive literature on health disparities, the central hypotheses of the proposed research was that despite “equal” access to healthcare there would be a disparity between the health care behaviors engaged in by ethnic minorities vs. Caucasians with Type 2 diabetes. The two specific aims of this project were to examine the association of ethnicity with utilization of care among insured individuals with Type 2 Diabetes and to examine ethnic/racial differences in quality of self-care in Type 2 diabetes by using the 1998 Medical Expenditure Panel Survey (MEPS) database.

Study Implications

If disparities in health care utilization persist among ethnic minorities with health insurance, then cultural factors may play a role in deterring individuals from utilizing care despite having access. This finding would suggest that insurance barriers are not the

sole cause for delaying and underutilizing of health care resources. Other latent factors may be impeding the health care access process among ethnic minority groups.

Aim One. Utilization. The association of ethnicity with utilization of care among insured individuals with Type 2 diabetes.

1. Fewer physician visits. It was hypothesized that diabetic African American and Hispanic Americans would have fewer numbers of visits to a health care provider (i.e., outpatient physician visits and optometrist visits) compared to their Caucasian counterparts despite health care coverage or type (e.g., Private vs. Public). After controlling for potential confounders (i.e., age, family size, annual income, type of insurance, employment status, family's income as a percent of poverty line, highest degree achieved, and marital status), African American and Hispanics were expected to utilize less care.
2. Expenditures. It was hypothesized that African Americans and Hispanic Americans would have lower expenditures for medical care indicating less utilization of the health care system. After controlling for confounding factors, African American and Hispanics were expected to utilize less care.

Rationale for directionality of hypotheses

It is important to note that although, fewer visits and lower expenditures may be taken by some to mean a better quality of care, research in the area of minority health disparities has demonstrated that minorities utilize care less frequently thus fewer numbers of visits and lower expenditures were considered to be an indicator of poor use of the health care system by diabetic patients.

Aim Two. Quality. Ethnic/racial differences in quality of self-care in Type 2**Diabetes.**

3. Time. It was hypothesized that ethnic minorities, both African Americans and Hispanics would have longer time intervals to a preventive health visit/behavior, suggesting a poorer quality of their own self-care. Quality of self-care measures selected in the current study were based on the standards of care guidelines disseminated by leading organizations in the management of diabetes. These organizations are: American Diabetes Association, American Association of Clinical Endocrinologists and the Diabetes Quality Improvement Project. The recommendations for maintaining quality self-care among diabetic patients require that the prevention practices be engaged in at minimum once a year and daily medication management adherence (ADA, 1999; AACE, 2000; DQIP, 2003). Thus, the length of time since engaging in a preventive care behavior (i.e., > 1 year or < 1 year) or receipt of preventive health advice (i.e., yes or no) was measured for the following variables: blood pressure, cholesterol check, physical exam, influenza vaccination, nutritional advice, and dental exam.

4. Rx Totals and Expenditures. After controlling for age, family size, annual income, type of insurance, employment status, family's income as a percent of poverty line, highest degree achieved, and marital status, it was hypothesized that ethnic minorities (i.e., African Americans and Hispanics) would have lower prescription total numbers and lower prescription medication expenditures than their Caucasian counterparts. Fewer dollars spent on prescription medications would serve as a proxy for poorer quality of self-care since medication is part of the treatment guidelines for these patients. It is important to note that there are data on total numbers of prescription and

prescription expenditures, however, it is unknown what type of medications the patients used.

RESEARCH DESIGN AND METHODS

The Medical Expenditure Panel Survey (MEPS) is a nationally representative survey of the U.S. civilian non-institutionalized population (Weinick, Zuvekas, & Drilea, 1996). MEPS provides detailed health services data and through MEPS, “the medical expenditures and health insurance data of survey respondents can be linked to other characteristics such as demographic variables, employment status, economic status, health status, and use of health services” (p. 1, Cohen, S., 1996). In addition, MEPS is the only national survey that provides a way to estimate the impact in sources of payment for health services among different economic groups as well as racial and ethnic minorities. Data for MEPS were collected at both the person and household level under the authority of the Public Health Service Act (Weinick, Zuvekas, & Drilea, 1996). There are no unique identifiers associated with the data. Because the MEPS data is a nationally representative sample, there are weightings associated with the data and consequently national estimates and generalizations to the U.S. population at large can be made from this dataset by using the appropriate statistical package (AHRQ, 1999; Brogan, 1998) to account for these weights (i.e., STATA 7.0). The STATA (7.0) program uses the Taylor Series Expansion method (StataCorp, 2001) to “obtain robust variance estimators for complex survey data with stratified, cluster sampling with unequal probabilities of selection” (American Institutes for Research, 2004). In addition, a complete timeline of the process of using the MEPS data can be found in the appendix (See Appendix A).

Participants/Case Definitions

The sampling frame for the MEPS-Household Component was drawn from respondents to the National Health Interview Survey (NHIS), conducted by the National Center for Health Statistics (NCHS; Weinick, Zuvekas, & Drilea, 1996). The NHIS provided a nationally representative sample of the U.S. civilian noninstitutionalized population, with an oversampling of Hispanics and African Americans, individuals with functional impairments, children with limitations of activity, individuals predicted to incur high medical expenditures and individuals predicted to have incomes less than 200% of the poverty level (Cohen, S., 1997). A subsample of 10,500 households was drawn from the NHIS sampling frame for the initial 1996 MEPS-HC panel. Every five years the Household Component (HC) sample size has been increased (Weinick, Zuvekas, & Drilea, 1996). Based on the large number of households interviewed and the representative sample design, the strength of this type of design is that it allows weightings to be used to make national estimates. Weights are provided at the person-level and family-level.

The larger 1998 MEPS database (N=24,072) was used for this study. From this database, data were extracted for adult individuals between the ages of 21-64 with health insurance and an ICD-9 diagnosis of Type 2 diabetes. No children were included in this study (i.e., persons younger than 21 years). This research is focused on adults with health insurance and Type 2 diabetes and children are dependents and do not carry their own independent health insurance. They may qualify for health insurance programs only based on their parent or guardian's employment or income. In addition, individuals above 65 years were excluded from this study based on their eligibility for Medicare.

Although, Medicare is another public health insurance program, the structure of the Medicare program is different from Medicaid; and all individuals irrespective of financial need are eligible. Also, individuals over 65 years many times have more co-morbid illnesses, which may increase utilization of care.

Finally, individuals with and without diabetic complications were included in this study. The 5-digit ICD-9 diagnosis codes used in this study were as follows: 250.00 for Type 2 Diabetes without complications and 250.02, 250.10, 250.12, 250.20, 250.22, 250.30, 250.32, 250.62, 250.92, 250.70, 250.40, 250.42, 250.72, 250.50, 250.80, 250.52, 250.82, 250.60, and 250.90 for Type 2 Diabetes with Complications. In order to increase the sample size, individuals with and without complications were included in this study. No one was excluded based on gender and ethnicity.

Procedure

Overview of Data Collection & Procedure for the MEPS Survey

The MEPS survey is made up of four components. These components are: Household, Medical Provider, Insurance, and Nursing Home. Each component of the MEPS survey collects more detailed information on the specified topic. A brief description of the latter 3 components can be found in the Appendix (See Appendix B).

The component that was used in the present study was the Household Component (HC), which is the largest component of the MEPS survey. Household interviews were conducted using computer-assisted personal interviewing (CAPI) technology. Individuals were consented prior to entering the study. Participants were asked for each medical event, “what was the specified main medical condition/reason for the health care visit?” (Weinick, Zuvekas, & Drilea, 1996). The verbatim responses were reviewed and

assigned ICD-9 codes by trained coders. Survey data were collected by mail from both the household respondent and medical provider (Weinick, Zuvekas, & Drilea, 1996). Individuals were paid \$5 for completing the mail survey.

The Household Component (HC) of the MEPS collected detailed data on demographic characteristics, health conditions, access and utilization of care, charges, payments, health insurance coverage, income and employment (Weinick, Zuvekas, & Drilea, 1996). The variables used in the present study are detailed in the measures section (p.46). The HC used an overlapping panel design in which data were collected through a preliminary interview followed by a series of five rounds of interviews over a 2 ½ -year period (Weinick, Zuvekas, & Drilea, 1996). Each interview lasted from 2-10 hours (average interview- approximately 4 hours) and data were collected by computer-assisted interview. Individuals were paid \$30 for each interview with a maximum payment of \$150 for completing all five rounds of interviews. A more detailed description of the MEPS Household Component Survey procedure can be found elsewhere (See Cohen, J., 1997 & Cohen, S.B., 1997; Appendix C and D).

Accessing the MEPS Database

Researchers that require more specific data than that released to the general public are required to submit a proposal to the Agency for Health Care Research and Quality (AHRQ) for approval. Approval was obtained for the present study. Part of the approval process included being prior approved by the sponsoring university (See Appendix E). Another part of the approval through AHRQ required the researcher to read, agree, and sign the “CCFS Data Center User Guide”(See Appendix F). Upon receipt of approval from AHRQ (See Appendix F), the specified data were released to the researcher only in

the Data Center (which is a physical space located at AHRQ in Rockville, MD). The restricted data files that were released only in the data center contained information that was not released to the public. These “restricted” data files contained geographic variables at a lower level than released for public use and more detailed condition information consisted of unedited database segments not yet prepared for public release. “The restricted data sets do not contain information that would directly identify a respondent (name, social security number, street address)” (AHRQ, 2002).

In order to further insure and protect the confidentiality of respondents, the environment of the Data Center was monitored. Researchers were only allowed access to the information that they requested in relation to their project. Materials were not removed from the Data Center until they were reviewed and approved by the Data Center staff. Only summary output (e.g., tables, regression equations, parameter estimates) were allowed to be removed from the Data Center. Micro data files were not removed from the Data Center (AHRQ, 2002).

Risks/Benefits

Risks associated with this study were minimal. Although data were collected at the person and household level, there were no unique identifiers (i.e., to identify an individual respondent) associated with the data released to the public. The data were collected by AHRQ under the authority of the Public Health Service Act. All of the data were edited and published in accordance with the confidentiality provisions of this act and the Privacy Act.

Measures

Overview of Measures within MEPS Database

The Household Component of the MEPS database contained 44 subsections (AHRQ, 2001). Each subsection probed a different aspect related to the respondent's health care (e.g., medical provider visits, prescription expenditures). Based on the scope and purpose of this project, four subsections were extracted from the larger Household Component (HC) survey: Demographic Information, Medical Provider Visits, Preventive Care, and Health Insurance. From each of these subsections, questions were extracted for detailed analysis. Copies of the targeted variables for this project are included in the appendix (See Appendix G). Comparisons were made by ethnicity, gender, age category and insurance type.

Based on the way the MEPS survey was designed and the way the data were collected, many of the variables were used as proxy measures of utilization and quality of self-care. Specifically, health care visits were used to indicate utilization. However, financial data such as expenditures and medical charges were also used as a proxy measure that indicated direct utilization of the health care system. For proxy measures of quality of self-care, time since engaging in the preventive health care visit/behavior (i.e., >1 year or <1 year) and preventive health care expenditures were used as an indication of quality of self-care for the individual. That is, if an individual with Type 2 diabetes engaged in these recommended health care visits/behaviors (e.g., yearly blood pressure check, cholesterol check, physical exam, etc.), they were engaging in quality self-care.

Case Definition

Medical Conditions. Data were included in the present study based on the following 3 inclusion criteria: a 5-digit ICD-9 diagnosis of Type 2 diabetes (i.e., Type 2

diabetes with and without complications), age between 21-64 years, and health insurance coverage (i.e., Public or Private coverage).

Independent Variables

Demographic Information. Each household respondent was asked to report information on race/ethnicity, gender, age, family size, marital status, education, employment status, occupation type, income, Census region, perceived mental and physical health status (See Appendix G). These variables are briefly described and defined below:

Race/ethnicity: Caucasian, African American and Hispanic data were extracted.

Age/Age Categories: Age data were collected in years. However, in order to analyze differences between age groups, the data were collapsed into five different age categories (i.e., 21-29, 30-39, 40-49, 50-59, 60-64).

Family Size: The number of persons per family unit was collected for each MEPS participant.

Education: Data were collected on the total years of education and the highest degree achieved.

Employment Status: Data were collected on whether the individual was employed or unemployed.

Occupation: Type of occupation was classified. There were 12 job categories including the following: professional, managerial/administrative, sales worker, clerical worker, craftsmen/foremen, operatives, transport operatives, service workers, non-farming laborers, farm owners/managers and unclassifiable occupations.

Income: The individual's annual income was collected in U.S. dollars. In addition, the family's income was derived by constructing person-level total income comprising annual earnings from wages, salaries, bonuses, tips, commissions; business and farm gains and losses; unemployment and workers' compensation; interest and other sources of income excluding tax refunds and capital gains. Person level incomes were then summed over family members to yield the family-level total. Then, family-income was divided by the applicable poverty line (i.e., based on family size and composition) and categorized as a percentage of the poverty line. The five categories were as follows: 1-negative or near poor (i.e., less than 100%), 2-near poor (i.e., 100% to less than 125%), 3-low income (i.e., 125% to less than 200%), 4-middle income (i.e., 200% to less than 400%), or 5-high income (i.e., greater than or equal to 400%).

Census Region: Census region was collected for the four main areas of the U.S.: Northeast, Midwest, South, and West.

Perceived Mental and Physical Health Status: Participants were asked to rate their mental and physical health status independently. There were 5 rating categories for each of these variables: excellent, very good, good, fair and poor.

Health Insurance. The Health Insurance subcomponent (See Appendix G) probes household respondents' knowledge of their type of health insurance plan. For purposes of this study access to care was implied by having health insurance, whether private or public coverage. Health insurance type was categorized as either public or private insurance.

Dependent Variables

Medical Provider Visits and Expenditures. From the HC, data were extracted on the number of outpatient provider visits and health care charges for 1998. Specifically, the medical provider visit variables that were examined in this study were: 1) # of outpatient physician visits and 2) # of office-based optometrist visits. In terms of medical provider expenditure data, the following variables were extracted: 1) total amount for health services in 1998, and 2) the total amount paid out-of-pocket by self/family for medical expenses in 1998 (includes co-pays and over-the counter medications).

Preventive Self-Care. The Preventive and Alternative Care subcomponent (See Appendix G) assesses the length of time since the household respondent engaged in a preventive health visit/behavior. Length of time since last preventive health visit/behavior was collapsed into two time categories: <1 year and >1 year and receipt of preventive health advice was collapsed into yes or no. The following preventive health variables used in this study are briefly described below:

Blood pressure: Time since last blood pressure check, <1 year or >1 year.

Cholesterol: Time since last cholesterol check, <1 year or >1 year.

Physical exam: Time since last complete physical exam, <1 year or >1 year.

Influenza vaccination: Time since last influenza vaccination, <1 year or >1 year.

Nutritional advice: Receipt of nutritional advice, yes or no.

Dental exam: Time since last dental exam, <1 year or >1 year.

Prescription (Rx) Totals & Expenditures. Total number of Rx medications, total amount paid out-of-pocket for Rx, and the Rx expenditures for 1998 were collected for each individual. It is important to note that the way that the MEPS data are collected; the total numbers of Rx medications in this dataset are not differentiated. That is, all

refills are included. For example, it is unknown whether the total Rx medication number indicates one Rx medication refilled a number of times or three distinct Rx medications refilled a number of times. Finally, it is unknown whether the medications filled or refilled are for diabetes.

Data Analytic Procedure

The MEPS data is a complex survey design that over sampled specific target populations (i.e., African American and Hispanic Americans) and used cluster and stratified sampling. Based on this design, STATA (v.7), a statistical package that corrects for the non-random sample design, was used so that the appropriate standard error estimates could be calculated (Brogan, 1998; StataCorp, 2001). This program accounts for weightings. The weightings can be used to make national estimates. A copy of the program for extracting the data can be found in the Appendix (See Appendix H).

Analytic Strategy

The categorical data were analyzed by race, gender, age group and insurance type using chi-square analyses. These categorical data were collapsed into one of two response categories: “yes” vs. “no” or “>1 year” vs. “<1 year”. Responses of –1 (i.e., not applicable), -9 (i.e., not ascertained) were coded as 2 (i.e., either “no” or “>1year”) depending on the response set for the type of question.

Regression analyses were used to examine the association of race among the continuous variables (e.g., physician visits, medical expenditures, and Rx expenditures). Race was dummy coded with Caucasians as the reference group. Potential confounders were controlled for in all regression analyses after determining if there were significant differences between the groups on demographic characteristics. Based on the non-normal

distribution of the visit and expenditure data (i.e., positive skewness), data were log transformed to meet the normality assumption of dependent variables in regression analyses (Kleinbaum, Kupper, Muller, & Nizam, 1998). Log functions were then entered into the regression model. Finally, all data are presented in Table format. Key relationships are also depicted as Figures.

Results

Study Sample

The sample size for Panels 1 and 2 of the 1998 MEPS dataset was 24,072 participants. Approximately half (53.4%; 12,854 participants) of the sample was between the age of 21 and 64.

Of the 1180 individuals with a 3-digit ICD-9 diagnosis of 250 (i.e., diabetes mellitus), only 506 (42.9%) met the case definition for the current study. All subsequent analyses were conducted with this subsample ($n=506$).

Demographic Characteristics

The dataset contained 226 (46.3%) males and 280 (53.7%) females (See Table 1). There were 292 (57.7%) Caucasians, 96 (19.0%) African Americans, and 118 (23.3%) Hispanic Americans (See Table 1). The mean age for the overall sample was 50.9 years (95% CI 49.7-52.0). Less than 1% of the variance in age is explained by race ($p=.65$). Thus, there is no difference between the ethnic groups in mean age (See Table 1). There were no differences by race among the age categories ($\chi^2(8)=105.81, p=.85$; See Table 2).

Insurance Type

Sixty-nine percent ($n=347$) of the sample had private health insurance and 31% ($n=159$) had public insurance coverage. There were significant differences by race in insurance type ($\chi^2(2)=1099.38, p<.05$; See Table 3 & Figure 1). Forty percent of African Americans and 36% of Hispanics had public health coverage compared to 16% of Caucasians. There were statistically significant gender differences by coverage type with 29% of women having public coverage compared to only 16% of men ($\chi^2(1)=522.29, p<.001$; See Table 4 & Figure 2). Among males and females separately, there were significant race differences by insurance type. Twenty-seven percent of African American and 21% of Hispanic males had public insurance compared to only 13% of Caucasians ($\chi^2(2)=420.52, p<.05$; See Table 5 & Figure 3). In addition, 48% of African American and 46% Hispanic females had public health coverage compared to only 20% of Caucasian women ($\chi^2(2)=1564.41, p<.05$; See Table 6 & Figure 4).

Marital Status

Sixty percent of the sample was married and 16% of the sample was divorced and 14% were single/never married. Seven percent were widowed and only 3% were separated. There were statistically significant differences by race and marital status with 36% of African Americans being married compared to 66% Caucasians and 57% Hispanics being married ($\chi^2(8)=1077.41, p<.05$; See Table 7 & Figure 5). Also, 50% of African Americans in this sample indicated that they were divorced (27%) or never married (23%; See Table 7 & Figure 5). Results remained the same among privately insured individuals with 23% of African Americans being married and over 45% being either divorced (23%) or single (18%) compared to 20% of Caucasians and 31% of Hispanics ($\chi^2(8)=495.20, p<.05$; See Table 8 & Figure 6). Finally, there was no

difference by race in marital status among the publicly insured ($\chi^2(8)=1824.10, p=0.17$; See Table 9).

Family Size

The overall mean family size for the sample was 2.6 persons (95% *CI* 2.42-2.74). There were statistically significant differences among the groups in family size with 3% of the variance being explained by race ($p<.05$). Hispanics had the highest mean number of family members ($M=3.3$ persons, 95% *CI* 2.89-3.74) compared to Caucasians and African Americans ($M=2.5$ persons, 95% *CI* 2.32-2.63; $M=2.5$ persons, 95% *CI* 1.96-3.11, respectively). There was a statistically significant difference in the family size of Hispanics and Caucasians ($t(315)=3.52, p<.05$). The data were also analyzed by insurance type and there was no statistically significant difference in family size ($t(317)=-.64, p=.52$).

Education

The overall mean number of years of education for the sample was 12.30 years (95% *CI* 11.98-12.61). There were statistically significant differences among the groups in the number of years of education with 6% of the variance in being explained by race ($p<.01$). Specifically, Caucasians and African Americans had the highest mean number of years of education ($M=12.64$ years; 95% *CI* 12.29-12.98), 12.24 years (95% *CI* 11.71-12.76), respectively) and Hispanics had the lowest ($M=10.29$ (95% *CI* 9.09-11.49)). Comparing minority groups to Caucasians as the reference group, there were no statistically significant differences between the majority group and African Americans in years of education ($t(315)=-1.31, p=.19$). However, Hispanics had fewer years of education when compared to Caucasians ($t(315)=-3.67, p<.05$). When data were

analyzed by gender, there was a statistically significant difference in the number of years of education. Women had significantly less years of education than men ($M=11.74$, 95% CI 11.32-12.17; $M=12.93$, 95% CI 12.52-13.35; respectively, $t(317)=-4.08$, $p<.01$).

Finally, when data were analyzed by insurance type, there was a statistically significant difference in the mean years of education, with publicly insured individuals having 2.82 fewer years of education than those privately insured ($t(317)=-7.03$, $p<.01$).

Data were collected on highest degree achieved. Approximately 50% of the individuals in this sample had a high school diploma. There were statistically significant differences by race in the highest degree achieved ($\chi^2(12)=1816.42$, $p<.05$; See Table 10 & Figure 7). Specifically, 55% of Caucasians had a high school degree compared to 31% and 34% (respectively) of African American and Hispanics. In addition, minority groups were more likely to have no degree (42% and 44%, respectively) when compared to Caucasians (15%).

Chi-square analyses among privately insured individuals also revealed significant differences by race in the highest degree achieved ($\chi^2(12)=835.30$, $p<.05$; See Table 11 & Figure 8). Among the privately insured 22% of African American and 25% of Hispanic individuals had no degree, compare to only 10% of Caucasians. Chi-square analyses among the publicly insured could not be conducted because a large portion of the cells had zero cell counts.

Employment and Occupation

Two-thirds of the individuals in this sample were employed. However, there were significant differences by race in employment status ($\chi^2(2)=332.73$, $p<.01$). Fifty-four percent African Americans and 42% Hispanics were unemployed compared to 36% of

Caucasians (See Table 12 & Figure 9). When gender by employment status was analyzed among the groups, 29% of Caucasians and 32% of Hispanics males were unemployed compared to 53% of African American males being unemployed ($\chi^2(2)=519.09, p<.05$; See Table 13 & Figure 10). There were no significant differences by race in employment status among women ($\chi^2(2)=189.86, p=.26$; See Table 14). Also, data were analyzed by insurance type and there were no differences by race in employment status among the privately insured ($\chi^2(2)=0.68, p=.99$; See Table 15). However, differences were found by race in employment status among the publicly insured ($\chi^2(2)=1002.69, p<.05$; See Table 16 & Figure 11). A greater percentage of Caucasians (20%) and Hispanics (30%) were employed compared to African Americans (4%).

Of the individuals that were employed, data were also collected on occupation type. There were significant differences by race in occupation type ($\chi^2(22)=1831.25, p<.01$; See Table 17 & Figure 12). It is important to note that Pearson's statistic accounts for sparse and non-sparse tables (Stata 7.0, 2001). One third of African Americans had clerical jobs compared to less than 12% of Caucasians and 14% Hispanics having that type of job. Also, 30% of African Americans and 23% of Hispanics were service workers compared to 19% of Caucasians in this same job type. Specifically, more Caucasians (34%) were in professional/managerial occupations compared to African Americans and Hispanics (13%, 19%, respectively).

Income

The mean income of the overall sample was \$22, 804 (95% CI 20483-25125; See Table 18). There were significant differences among the groups in annual income with

Caucasians having the highest total income ($M=\$25,006$, 95% CI 21957-28056).

Hispanics were in the middle with a mean annual income of \$19,843 (95% CI 14710-24975). African Americans had the lowest ($M=\$15,852$ (95% CI 13326-18378). Three percent of the variance in annual income can be explained by race. There was a statistically significant difference in the annual income of Caucasians and African Americans ($t(315)=-4.35$, $p<.05$). However, there was not a statistically significant difference in the annual income between Caucasians and Hispanics ($t(315)=-1.70$, $p=.09$).

When income data were also analyzed by gender, men ($M=\$28,952$, 95% CI 24673-33231) made significantly more money annually than women ($M=\$17,496$, 95% CI 15057-19936; $t(317)=-4.47$, $p<.05$). Finally, when income data were analyzed by insurance type, there was a statistically significant difference in total person's income ($t(317)=-11.06$, $p<.01$), with publicly insured individuals earning \$17,996 less than their privately insured counterparts.

Data were also collected on the family's income as a percent of the poverty line with five poverty categories ranging from negative/poor to high income. Overall, 64% of this sample was in the middle to high-income category and 20% of the sample were in the poor or near poor category. Fifteen percent of the sample was in the low-income category. There were significant differences by race in the percent of family's income compared to the poverty line ($\chi^2(8)=2756.25$, $p<.05$; See Table 19 & Figure 13).

Specifically, over half of ethnic minorities had incomes that were low, poor or near poor compared to approximately 20% of Caucasians. In addition, almost 40% of Caucasians had an income in the high category compared to 27% of Hispanics and only 13% of African Americans having a similar high income. The same race differences remained

among those with private health insurance only ($\chi^2(8)=1063.41, p<.05$; See Table 20 & Figure 14) as well as those with public insurance ($\chi^2(8)=3533.88, p<.05$; See Table 21 & Figure 15). When the income data were analyzed by gender, differences were found ($\chi^2(4)=970.59, p<.05$; See Table 22 & Figure 16). Forty-two percent of men had incomes in the high category compared to 25% of women. In the lower income categories women were over represented, with 5% in the poor, 20% in the near poor category compared to 3% of males in the poor category and 12% of males in the near poor category.

Census Region

Over 40% of the overall sample lived in the South. Twenty percent lived in the Midwest and Northeast, respectively and 15% lived in the West. Differences by race were found for census region with 55% of African Americans living in the south compared to 41% and 38% of Caucasians and Hispanics, respectively ($\chi^2(6)=1623.32, p<.05$; See Table 23). Also, fewer Hispanics (9%) lived in the Midwest compared to African American and Caucasians (19%, 25%, respectively). Thirty-nine percent of Hispanics lived in the West compared to only 13% and 7% of Caucasians and African Americans (respectively). Among those with private health insurance, 20% of Caucasians and African Americans lived in the Northeast compared to only 10% of Hispanics ($\chi^2(6)=1123.66, p<.05$; See Table 24 & Figure 17). There were no differences among those with public coverage ($\chi^2(6)=2229.55, p=0.10$; See Table 25).

Health Status

Self-reported health and mental health status were examined by race, gender, insurance type and age category. In terms of health status, 40% of the individuals rated

their health as either “fair” or “poor.” Less than one-quarter of the sample rated their physical health as very good or excellent. There were no statistically significant differences by race in self-reported physical or mental health status ($\chi^2(8)=591.74, p=.22$; See Table 26; $\chi^2(8)=584.07, p=.18$; See Table 27, respectively). Also, there were no differences by gender in ratings of physical health status ($\chi^2(4)=94.58, p=.84$; See Table 28).

However, there were differences in self-reported physical health status among individuals with different insurance types ($\chi^2(4)=2033.22, p<.05$; See Table 29 & Figure 18). Specifically, of those individuals with private coverage, over a third rated their health as very good (21%) or excellent (7%) compared to less than 11% of publicly insured individuals giving that rating. More publicly insured individuals rated their health as fair or poor (See Table 29 & Figure 18).

The data were analyzed by age category to determine if there were differences between younger and older individuals. There were statistically significant differences among age categories in perceived health status, with older individuals (i.e., 50-59, 60-64) classifying their health as fair or good compared to younger age groups (i.e., 21-29, 30-39, & 40-49) classifying their health as good to excellent ($\chi^2(16)=1408.09, p<.05$; See Table 30 & Figure 19).

Overall, in terms of mental health status, over 80% of the sample gave a rating of good to excellent. For mental health status by insurance type, there was no statistically significant difference by race among those with private health coverage ($\chi^2(8)=214.15, p=.71$; See Table 31). There was a statistically significant difference in mental health status by race among those with public coverage ($\chi^2(8)=4261.73, p<.05$; See Table 32 &

Figure 20). More ethnic minorities rated their mental health in the excellent category. Specifically, 15% of African Americans and 40% of Hispanics rated their mental health as excellent compared to only 3% of Caucasians. There were no differences among age categories in self-reported mental health ($\chi^2(16)=722.11, p=0.24$; See Table 33).

Specific Aim 1: Utilization: The association of ethnicity with utilization of care among insured Type 2 diabetics.

Hypothesis 1: Physician visits. After controlling for potential confounders including age, family size, person's total annual income, type of insurance, employment status, family's income as a percent of the poverty line, highest degree achieved, and marital status (See Table 34), African American and Hispanics were expected to utilize less care. Fewer outpatient physician visits and office-based optometrist visits were used as proxy measures for poorer utilization. It was hypothesized that African American and Hispanic Americans would have fewer numbers of visits to a health care provider compared to their Caucasian counterparts despite health care coverage or type (Private vs. Public).

Physician visits

Outpatient physician visits and office-based optometrist visits data were collected for each individual in the MEPS dataset for 1998. The overall mean number of outpatient physician visits and optometrist visits was less than 1 ($M=0.43, 95\% CI 0.26-0.59$; $M=0.09, 95\% CI 0.05-0.12$, respectively). After controlling for potential confounders, there were no differences by race in outpatient physician visit $F(10, 307)=1.81, p=.06$; See Table 35) or optometrist visits $F(10, 307)=0.64, p=0.78$; See Table 36). Summary regression tables are presented in Tables 35 & 36. Based on the positive skewness of the data, the dependent variable has been log transformed. The first 8 demographic variables

entered into the model were entered as covariates. Race was dummy coded and Caucasians were the reference category. For example, African Americans are compared to Caucasians in overall number of outpatient visits and there is no difference in the number of visits between the groups controlling for the eight previous demographic variables. There were also no differences by gender in the mean number of outpatient visits ($t(317)=0.02, p=0.98$) or in the mean number of optometrist visits ($t(317)=0.91, p=0.36$).

Hypothesis 2: Expenditures. It was hypothesized that African Americans and Hispanic Americans would have lower expenditures for medical care indicating less utilization of the health care system.

Expenditures

Total amount for health services for 1998 was collected at the person level. The overall annual amount money spent on health services was \$4982 (95% CI 4236.48-5728.43). Cases spent as follows: Caucasians- $M=\$5320$ (95% CI 4411.24-6228.91), African Americans- $M=\$4570$ (95% CI 2700.76-6441.15) and Hispanics- $M=\$3525$ (95% CI 2217.90-4834.07). After controlling for potential confounders, there was a statistically significant difference for race for total amount of health services expenses for 1998 $F(10, 307)=3.62, p<.01$; See Table 37) with 10% of the variance accounted for in the overall model. Specifically, race accounted for approximately 3% of the variance in total health care expenses. Specifically, African Americans spent 26% ($p<.05$) and Hispanics spent 28% ($p<.05$) less than Caucasians for health care services.

Individuals were asked to report the total amount paid out-of-pocket by self/family for medical expenses. The average out-of-pocket amount was \$766 (95% CI

672.45-861.31). After controlling for all potential confounders (i.e., age, family size, annual income, insurance type, employment status, family's income as a percent of poverty line, highest degree achieved and marital status), there were statistically significant differences by race in the amount paid out-of-pocket, with 2% of the variance being explained by race $F(10, 307)=3.92, p<.01$; See Table 38). Caucasians spent on average \$840 (95% CI 726.80-953.55). African American $M=\$576$, (95% CI 421.02-731.46) groups spent significantly less than Caucasians (i.e., 50% less) and there was a trend for Hispanics $M=\$605$, (95% CI 438.11-773.76) to spend less money out-of-pocket for medical expenses than their Caucasian counterparts ($t(3307)=-2.24, p<.05$ & $t(307)=-1.84, p=.07$, respectively). Women spent on average \$100 more than men out-of-pocket for medical expenses ($M=\$813$, 95% CI 704.57-923.10; $M=\$712$, 95% CI 563.12-861.85, respectively). However, there were no statistically significant differences by gender ($t(317)=1.12, p=0.26$).

Specific Aim 2: Quality of Self-Care & Preventive Care Utilization: Ethnic/racial differences in quality of self-care in Type 2 Diabetes.

Hypothesis 3: Time. It was hypothesized that ethnic minorities would have longer times (i.e., >1 yr vs. <1 yr) since engaging in a preventive health visit/behavior, indicating a poorer quality of self-care.

Time: Preventive Self-Care.

Analytic Strategy: Time since last preventive care health visit/behavior was analyzed by race, gender, age category and insurance type for each dependent variable.

a. Blood pressure check

Ninety-two percent of the overall sample had their blood pressure checked within the last year. Also, there were no statistically significant differences in time since last blood pressure check by race ($\chi^2(2)=54.51, p=0.53$; See Table 39) by age category ($\chi^2(4)=57.15, p=0.73$; See Table 40), or by insurance type (i.e., among privately insured ($\chi^2(2)=48.58, p=0.51$; See Table 41) or among publicly insured ($\chi^2(2)=15.21, p=0.83$; See Table 42)). However, differences were found by gender ($\chi^2(1)=429.811, p<.05$; See Table 43 & Figure 21). A higher percentage of men (11%) than women (4%) waited more than one year to have their blood pressure checked.

b. Cholesterol check

Overall, 78% of individuals had a cholesterol check within the last year. There were no statistically significant differences by race for time since last cholesterol check ($\chi^2(2)=8.58, p=0.91$; See Table 44) or by age category ($\chi^2(4)=351.92, p=0.15$; See Table 45). Also, there was no difference by gender ($\chi^2(1)=151.54, p=0.17$; See Table 46) or insurance type (i.e., among privately insured ($\chi^2(2)=13.11, p=0.82$; See Table 47) or among publicly insured ($\chi^2(2)=2.97, p=0.97$; See Table 48) in time since last cholesterol check.

c. Physical exam

Seventy-two percent of individuals had a physical in the last 12 months. There were no statistically significant differences by race ($\chi^2(2)=58.79, p=0.48$; See Table 49), by gender ($\chi^2(1)=87.82, p=0.30$; See Table 50), by insurance type (i.e., among privately insured ($\chi^2(2)=23.75, p=0.71$; See Table 51) or among publicly insured ($\chi^2(2)=8.19, p=0.86$; See Table 52)) in time since last physical exam. However, differences were found by age category in time since last physical ($\chi^2(4)=351.92, p<.05$; See Table 53 &

Figure 22). Specifically, 40% of individuals in the middle age category (i.e., 40-49) had not had a physical exam in the last 12 months.

d. Influenza vaccination

Forty-six percent of the sample had an influenza vaccination within the last 12 months. There was a trend toward racial differences in time since last influenza vaccination ($\chi^2(2)=248.59, p=.07$; See Table 54). There were no differences by gender ($\chi^2(1)=47.52, p=0.43$; See Table 55), age category ($\chi^2(4)=229.31, p=0.25$; See Table 56) or race among privately ($\chi^2(2)=80.85, p=0.38$, See Table 57) and publicly ($\chi^2(2)=62.84, p=0.41$; See Table 58) insured individuals in receiving an influenza vaccination.

e. Nutritional Advice

Whether or not the person received nutritional advice was analyzed by race, gender and age category. Ninety-eight percent of insured type 2 diabetics had not received nutritional advice. There were no statistically significant differences by race in receiving nutritional advice ($\chi^2(2)=5.55, p=0.91$; See Table 59). There were no differences by gender in receipt of nutritional advice ($\chi^2(1)=197.20, p=0.14$; See Table 60). There were also no differences by race in receiving nutritional advice among those privately ($\chi^2(2)=24.84, p=0.73$; See Table 61) and publicly insured ($\chi^2(2)=273.06, p=0.45$; See Table 62).

f. Dental Exams

Dental care data were collected using total dental expenditures for 1998 and time since last dental check. The overall dental expenditure amount for this sample was \$112 (95% CI 68.48-156.24). After controlling for age, family size, total annual income, type of insurance, employment status, poverty status, highest degree achieved and marital

status, the log of the dental expenditure data were entered into the regression model and analyzed by race. There was a statistically significant difference for race for dental expenses $F(10, 307)=5.51, p<.05$; See Table 63) with 1% of the variance accounted for by race. For dental care expenses, cases spent as follows: African Americans $M=\$65$ (95% CI 26.73-105.12), Hispanic Americans ($M=\$45$, 95% CI 21.28-70.03) and Caucasians ($M=\$134$, 95% CI 74.29-195.02).

There were no statistically significant differences in the dental expenditures by gender ($t(261)=-0.42, p=0.68$). Male expenditures for 1998 totaled \$125 (95% CI 39.21-211.91) and the female expenditures totaled \$100 (95% CI 67.68-134.24).

Additionally, there were statistically significant differences in the mean dental expenditures between privately and publicly insured ($t(317)=-3.39, p<.01$). The mean expenditures for privately and publicly insured were as follows: Private- $M=\$136$ (95% CI 79.79-192.95) and Public- $M=\$30$ (95% CI -166.68--44.19).

Only 31% of individuals in this sample had a dental exam in the last 12 months. There were statistically significant differences by race in time since last dental exam ($\chi^2(2)=444.58, p<.05$; See Table 64). Only one-quarter of African Americans (19%) and Hispanics (26%) had had a dental exam in the last year compared to over a third of Caucasians (35%). There was no statistically significant difference by race among privately insured or publicly insured in time since last dental exam ($\chi^2(2)=330.90, p=0.09$; See Table 65; $\chi^2(2)=8.58, p=0.91$; See Table 66, respectively).

Hypothesis 4: Rx Totals and Expenditures. It was hypothesized that ethnic minorities would have lower prescription totals and lower prescription medication expenditures than

their Caucasian counterparts. Fewer dollars spent on prescription medications would suggest poorer quality of self-care.

Rx Medication Totals

Prescription medication numbers and expenditures were collected for each person. The overall mean number of prescribed medications (including refills) for 1998 for this sample was 31.6 (95% CI 28.21-34.88). The mean number of medications by racial group were as follows: Caucasians- $M=32.97$ (95% CI 28.55-37.39), African Americans- $M=31.05$ (95% CI 23.97-38.13), and Hispanics- $M=23.84$ (95% CI 19.09-27.88). After controlling for the potential confounding variables, the overall regression model was statistically significant with the entire model accounting for 13% of the variance in total medications and race accounting for approximately 3% of the variance in overall number of medications, $F(10, 307)=3.34, p<.01$; See Table 67). There was a trend toward a difference between the mean number of medications of Hispanics and Caucasians with Hispanics having fewer medications ($t(307)=-1.80, p=.07$). There were statistically significant differences by gender in total number of Rx medications, with women having approximately 7 more prescriptions annually than men ($t(317)=2.34, p<.02$). Finally, there was a statistically significant difference in total numbers of medications (including refills) by insurance type ($t(317)=3.56, p<.01$). Specifically, publicly insured individuals had a total of 13 more prescriptions (including refills) per year than their privately insured counterparts ($M=42.23, 95\% \text{ CI } 34.78-49.69$; $M=28.39, 95\% \text{ CI } 25.06-31.73$, respectively).

Rx Medication Expenditures

Data for two prescription expenditure variables were collected: total Rx expenses for 1998 and total Rx expenses paid by self/family for 1998. The mean yearly cost for prescriptions for this sample was \$1317 (95% *CI* 1136.95-1497.07). There were differences by race in yearly costs with cases spending as follows: Caucasians $M=\$1448$, 95% *CI* 1208.22-1688.96), African Americans $M=\$1096$, 95% *CI* 778.65-1413.60) and Hispanics $M=\$842$, 95% *CI* 642.33-1041.84). Differences by race were found in yearly cost $F(10,307)=3.10$, $p<.001$; See Table 68) with 1% of the variance being explained by race. Women had approximately \$250 more in Rx costs than men. However, the difference was not statistically significant ($t(317)=1.51$, $p=0.13$). As for differences by insurance type, there was a statistically significant difference ($t(317)=2.21$, $p<.05$), with publicly insured individuals ($M=\$1717$, 95% *CI* 1277.45-2156.83) spending \$518 more than privately insured ($M=\$1199$, 95% *CI* 1015.71-1382.31).

As for amount spent out-of-pocket by self/family, the group mean was \$439 (95% *CI* 382.03-497.49). Cases spent as follows: Caucasians- $M=\$464$ (95% *CI* 390.06-538.54); African Americans- $M=\$397$ (95% *CI* 278.56-516.25) and Hispanics- $M=\$352$ (95% *CI* 257.47-448.44). After controlling for confounding variables, the overall model accounted for 8% of the variance in out-of-pocket prescription expenses and race accounted for 1% of the variance $F(10, 307)=2.76$, $p<.05$; See Table 69). When data were analyzed by gender and insurance type, there were no differences in the mean Rx medication out-of-pocket amount ($t(317)=1.63$, $p=0.10$; $t(317)=1.57$, $p=0.12$, respectively).

In summary, these findings partially confirmed the hypothesis that Hispanics not African Americans would have fewer numbers of medications and lower costs than their

Caucasian counterparts. A finding of higher amounts and more medications would indicate engaging in better self-care on the part of these groups because they would be following the recommendations.

DISCUSSION

The present study was based on the premise that insured individuals have access to health care. Despite insurance that provides access, it was expected that African Americans and Hispanics would have less utilization of care; lower expenditures for care, and would use self-care less frequently. There were three major findings of this study. First, despite having health insurance, low-income individuals with diabetes regardless of ethnicity, underutilized care as per recommended care in various clinical guidelines (ADA, 1998; AACE, 2000; DQIP, 2003). Second, there were no differences observed in the frequency of prescriptions and expenses for African Americans and Hispanics as compared to Caucasians. Lastly, total health services and out-of-pocket expenses for African Americans and Hispanics were lower than their Caucasian counterparts.

It is important to emphasize that individuals in this sample had lower incomes than the general US population. Many of these individuals were unemployed. There were differences by race on some of the key demographic variables (e.g., marital status, income, education, etc.). Research has indicated deleterious associations between some demographic variables and health outcomes (e.g., marital status (i.e., being single), Ross, Mirowsky, & Goldsteen, 1990; Waldron, Hughes & Brooks, 1996; lower income, Williams, 1998; Shi, 2000; lower education, Williams, 1998; Shi, 2000; Shi & Singh, 2000); however the care received among all groups was not associated with race specific differences in care.

It is also important to understand the implications of these findings as they relate to the U.S. population as a whole. For this study, the 506 individuals extracted for data analyses actually represent a larger U.S. subpopulation of 4,986,605 persons with lower incomes, age 21-64 years with Type 2 diabetes. With over 16 million Americans suffering from Type 2 diabetes, the utilization patterns and self-care behaviors of this sample can be extrapolated to represent 30% of the individuals living in the U.S with Type 2 diabetes. Ultimately, understanding the utilization patterns of this third of diabetics becomes paramount because their “use” or lack of use (i.e., underutilization) of care can greatly increase health care costs in the U.S.

Health Care Utilization Data

Overall, it was expected that insured Type 2 diabetic individuals from ethnic minority groups (i.e., African Americans and Hispanics) would have fewer visits than their Caucasian counterparts; however, there was a low level of utilization among the entire sample (i.e., irrespective of ethnicity) for the calendar year 1998. These findings of low utilization are consistent with research in this area documenting the common underutilization of recommended guideline-based diabetes care (Saadine et al., 2002) and preventive self-care practices among diabetic patients (Beckles, Engelgau, Venkat Narayan, Herman, Aubert & Williamson, 1998; Gregg et al., 2001). All individuals regardless of ethnic group sought care less than 1 time per year from an outpatient physician or optometrist. This stands in stark contrast to current standards of care for diabetics, which recommend 6-9 visits per year. Thus, this group, as a whole, did not utilize care effectively despite having health insurance. This finding indicates that having health insurance may not necessarily be associated with utilization or optimal utilization;

corroborating the work of others suggesting insurance coverage alone may not be enough to eliminate health disparities (Adler et al., 1993; Bashshur, Homan, & Smith, 1994; IOM, 2002).

Type 2 diabetics are required by the ADA Standards of Care to have a complete physical examination yearly to include glucose levels, skin and foot care as well as blood pressure and cholesterol levels. In addition, they are recommended to visit their primary physician at least 2-4 times a year to have their blood glucose control measured (e.g., A1c). Also, it is recommended that diabetic patients have additional members on their health care team to manage their disease, and at least 1 visit per year to the following health care professionals is strongly advocated: podiatrist, dietician (preferred Certified Diabetes Educator (CDE)), nurse educator (preferred CDE), dentist, and an optometrist or ophthalmologist. This translates into 6-9 visits per year, and this could be expected to be higher if individuals have complications or poor glucose control. Early detection of complications is paramount in this chronic disease and DCCT (1993) and UKPDS (1998) clearly documented the importance of consistent and vigilant care among this group. Seventy-two percent of insured Type 2 diabetics had had a physical exam in the last 12 months. Although there were no differences by race, type of insurance, and gender; age category differences were found. Specifically, 40% of individuals in the middle age category (i.e., 40-49 years), had not had a physical exam. This finding is surprising considering that this age category is at greatest risk for developing or experiencing complications (ADA, 1999).

At this one visit, individuals appeared to be receiving several key preventive exams including blood pressure and cholesterol screenings. In fact, over 90% of

individuals in this study had their blood pressure checked within the last year. For cholesterol screenings, almost 80% of the sample had had a cholesterol check within the last year. These findings are consistent with the recent data presented from the Behavioral Risk Factor Surveillance System (BRFSS), which found that there was an increase in blood pressure and cholesterol checks among diabetic patients from 1995-2001 (Okoro, Mokdad, Ford, Bowman, Vinicor, & Wayne, 2004). These findings also suggest that campaigns promoting the importance of blood pressure and cholesterol screenings and even a yearly physician exam are working among this patient sample. However, utilization still remains less than optimal.

Additionally, nutrition consults were essentially ignored with 98% of patients not receiving nutritional counseling in the last year. This percentage is sobering considering that diabetics have stringent dietary guidelines and nutrition education is at the cornerstone for maintaining health in this population. Self-monitoring of dietary intake is a daily task that diabetics must understand clearly and thoroughly to maintain quality self-care. Again, this finding is surprising, considering ADA guidelines recommending yearly nutrition counseling and more frequently if patients are in poor control or noncompliant. This finding may also suggest that perhaps these diabetic patients are not receiving care from a diabetes educator, specialist, or diabetes center. These results also suggest that alternatives to conventional nutritional counseling may need to be considered.

Dental care is another area of concern among diabetic patients and was also underutilized. Individuals with diabetes are at increased risk for gum disease as well as abscesses (ADA, 1997). Therefore, consistent dental checks are important. This study

found that only a third of insured diabetics had had a dental exam in the last 12 months. Diabetics, similar to all individuals, are suggested to have dental check once every six months. There were also statistically significant differences by race in dental expenses and a trend for race differences in dental charges. Specifically, Caucasians had almost twice the amount of dental expenses as African Americans and Hispanics. This finding demonstrates that there is a disparity in dental care utilization among minority groups. These data are consistent with dental data that show that civilian ethnic minorities (i.e., African Americans) overall have poorer dental care utilization (Chisick, 1995). Given the importance of dental hygiene, particularly among diabetics, specifically, African American and Hispanic patients may not be receiving oral care messages.

It is also recommended that certain high-risk individuals (e.g., elderly, individuals with lung or heart disease, those residing in nursing homes, etc.), particularly Type 2 diabetics, receive an influenza vaccination yearly (Nicholson, Snacken, & Palache, 1995). There were no differences by race in receipt of a flu shot, however; overall only 42% of insured diabetics had received one. This finding is consistent with Benjamin and Cook's (1997) report that found that only 52% of diabetics had a flu shot within the past 12 months. One explanation for this low percentage could be that Type 2 diabetics are not receiving proper education around issues of flu vaccinations and increasing awareness around this issue maybe of interest to the health care community.

Finally, health status is a very important variable when assessing health care behaviors. Many times examining how individuals perceive their health is a strong predictor of their actual health. As one would expect, younger individuals rated their health higher than older individuals. In terms of insurance type, this study found that the

publicly insured rated their health worse than those with private insurance. This finding is consistent with data that indicate that the publicly insured experience poorer health outcomes and thus a lower health status. If individuals are less likely to receive quality care, less likely to have a regular source of care, it stands to reason that they may suffer from poorer health and their perception of their health status is accurate.

For mental health status, over 80% rated their mental health as excellent. Interestingly, more publicly insured ethnic minorities rated their mental as excellent as compared to Caucasians. This finding could demonstrate that despite being lower in SES, having poorer perceived health, minorities are more mentally resilient in the face of socioeconomic and health disparities. OR, this finding could corroborate research that has demonstrated that minorities are more likely to ignore mental health symptoms (Vaughn, 2001).

In conclusion, it seems that this group of individuals only saw their physician once a year (i.e., for a physical exam) and for the middle age group they did not even adhere to once a year despite all patients having this chronic health condition. Since individuals with Type 2 diabetes are expected to visit their physicians or health care professionals 6-9 times per year, this group was clearly underutilizing care.

All preventive health care requiring an additional physician or clinic visit were underutilized (e.g., dentist, nutritionist, and flu vaccines). Nutrition consults can also be seen as requiring another visit if individuals are not receiving their diabetes care in an office-based practice or clinic that has diabetes education resources and professionals (e.g., Dietitian or Certified Diabetes Educator). Thus, increasing education of patients about the components of quality self-care (i.e., a comprehensive health care team)

including nutritional counseling is needed through some type of unique approach (e.g., internet communication).

Health Care Expenditure Data

Despite similarities in low utilization across all ethnic groups, African Americans and Hispanics had lower expenditures for medical expenses as hypothesized. That is, less money was spent (i.e., by all sources of payment including health insurance carrier, out-of-pocket, etc.) on ethnic minorities' health care despite no difference in total number of outpatient physician visits. Based on the low level of use of the entire sample, it is easy to assume that these individuals would be higher risk for complications and more complications should lead to higher expenditures when the individual finally does access the system. Lower expenditures among minority groups could be the result of many factors. First, as suggested elsewhere, ethnic minorities may not get the same health care as their Caucasian counterparts (IOM, 2002). There has been a wide body of literature demonstrating disparate care among ethnic minorities as well as lower SES individuals. Explanations for this could include discrimination and general non-adherence due to transportation, work, language, or other barriers (IOM, 2002). Specifically, work by van Ryn and Burke (2000) found that physicians rated African American patients as less intelligent and less educated and more likely not to follow the doctors' advice than white patients even after the patients' income and education were controlled. Discrimination, prejudice and bias at the physician level could directly affect the utilization practices of these groups. In addition, understanding the influence of other personnel in the health care system (e.g., receptionists, nurses, admitting clerks) and their possible biases and behaviors could prove important and may impact the "climate" of the healthcare

experience (IOM, 2002) and decrease utilization among disadvantaged and ethnic minority groups. Thus, training all members of the health care system (i.e., providers and personnel) in the importance of culturally competent care is of vital importance.

Second, differences in expenditures could be related to differences in the type of providers seen by ethnic minorities. The IOM report (2002) documents that there has been little research on the use of other allied health professionals by ethnic minority groups. If ethnic minority patients were more likely than Caucasian patients to see a nurse practitioner than a physician, then their overall health expenses would be lower even if the total number of visits were comparable. Understanding the differences in care seeking and barriers faced among all individuals, particularly ethnic minorities is important in addressing the problem of health disparities.

Differences were also found in “out-of-pocket” medical expenses with Caucasians spending over \$200 more per year. There are several possible explanations for this. First, there may be discrepancy in the coverage of medical expenses based on insurance type. Co-pays, for the same services, may be higher for the privately insured compared to the publicly insured. Since there were more ethnic minorities covered under public health insurance, they may have spent less money “out-of-pocket” for the same medical expenses. Another interpretation of this finding is that, Caucasians have more money available to spend on medical expenses as a percentage of income because they made significantly more money than their ethnic minority counterparts. Quality diabetic care requires consistent use of expensive supplies and equipment (e.g., glucose meters, strips, lancets). Therefore, if insurance carriers do not reimburse individuals, patients may be more likely not to purchase these products. Less spent out-of-pocket for medical

expenses may suggest these supplies were not purchased and therefore maintenance of quality diabetic care may be compromised. This finding must be interpreted with caution however, because it is unclear from the data what was reimbursed.

Finally, there were no differences in prescription expenditures (i.e., total Rx expenses and out-of-pocket expenses) among the groups. Interestingly, African Americans had the same number of medications as Caucasians. However, there was a trend for Hispanic patients to have fewer medications per year than Caucasians despite a lack of differences in expenditures ($p=.07$). It is important to note that this finding must be viewed with caution because it is unclear from the data whether these Rx medications represent the same one medication refilled a number of times over the year or if they constitute a number of different Rx medications.

Study Limitations

Although the MEPS database provides a detailed source for data analyses (i.e., a large data source with the ability to examine health care use patterns and make national estimates), there were a number of limitations with this study, based on the way the MEPS data are collected. First, there was no regular physician label within the data, and research has shown that having a regular physician is a more powerful predictor of utilization than having insurance (Sox, Swartz, Burstin, & Brennan, 1998). In the area of diabetes research, and the medical community as a whole, continuity of care is important in managing any disease.

Second, there was no measure of delay, that is, there was no indication of the length of time from symptom onset to seeking care. Knowing the length of time from symptom onset to care seeking would help further identify areas for intervention to

increase care seeking. Third, it is also unknown if diabetes was the main reason for the visit since up to four ICD-9 codes could be listed in the event files. Fourth, there was no indication of the severity of pain or discomfort or even the severity of the illness or co-morbid illnesses, which may lead to immediate or delayed care seeking. It would be important to know the impetus for the visit, so that health care professionals can educate patients about the importance of consistent and frequent care in order to alleviate or ameliorate the discomfort that led to the visit.

Individuals with an ICD-9 diagnosis of Type 2 diabetes with and without complications were used in this study, which may constitute another study limitation. All of these individuals were included because there are a number of different complications and sub-ICD codes for these complications and for the purpose of this study, the health care patterns of the entire group of Type 2 diabetics was of interest. However, by including individuals with complications in the dataset, interpretation of the results are guarded based on the impact complications may have on utilization (i.e., individuals that have more complications may use more health care services and have higher health expenditures).

The overall mean income for the sample was low (e.g., \$22,804). The median U.S. income is \$42,409 (U.S. Census Bureau, 2002), so sample was below half of the U.S. population. With a low mean income, the data becomes skewed and the generalizability of the results can only be attributed to individuals in this income category¹.

Another limitation of the dataset results from the fact that individuals selected for MEPS previously participated in the NHIS survey. Thus, individuals may decline to

participate in MEPS based on their experience with NHIS (e.g., too time consuming, taxing on participant, etc.). Selecting previous NHIS participants provides a source for linking the two datasets and is thus efficient in terms of data collection. However, it would be ideal to select a different sample of individuals for MEPS because the MEPS participant pool may be biased.

In addition to being time consuming and taxing (e.g., 2-10 hour interviews, 5 times over a 2 ½ year period), low payment of subjects for completing the interviews may pose a problem. MEPS participants are paid \$30 for each interview with a maximum payment of \$150. The amount of time required coupled with the low payment may bias the sample towards individuals with lower incomes and those that are unemployed being available for the survey. This could cause a “floor” effect on the expenditure and utilization data.

Also, there is no direct information from the patients’ physician to corroborate visits and diagnoses (i.e., patient identifies themselves as diabetic). Examining the validity of the patient’s report would be ideal and although medical provider information is collected from the participant’s physician to verify visits and ICD-9 codes, according to AHRQ personnel, this data is in a “raw” form and is not available to the public for analysis. In addition, the specific type of physician seen is not recorded in the dataset. Given the variety of health care professionals the diabetic patient is recommended to

¹ After consulting with the data center manager at AHRQ, it was determined that there was an income data problem in the 1998 MEPS dataset resulting from a design flaw in the questionnaire. For example, if an individual had not filed income taxes by the time of the MEPS interview, they were “skipped” out of the income question. About 30% of those who should have been asked the main income and asset questions were incorrectly skipped. This results in increases in missing data regarding income and this missing data becomes imputed, which may give an inaccurate description of the income of the sample.

visit, knowing the type of health care professional would be important in assessing quality of care. While not the original purpose of the 1998 MEPS survey, direct markers of health and management of the disease (e.g., A1c measurement, glucose self-monitoring behaviors) would be ideal to obtain measures of health outcomes related to health behaviors and treatment procedures.

Finally, individuals over the age of 64 were not included in this study. However, research has shown that the peak age of onset for diabetes is 45 years (ADA, 1996). Thus, individuals in their mid-60's and older would be at the age for a more advanced disease state and might experience more complications. Thus, leading to increased use and expenditures in the health care system. Future research should examine the use patterns and expenses for insured diabetic patients over 65 years.

In conclusion, although there are limitations associated with use of the MEPS data, the benefits provided by a national dataset (i.e., the ability to make national estimates) are important in understanding health care utilization and expenditures among target groups and have implications for changes in public policy affecting these disadvantaged groups.

Summary

In this study, there was an overall low level of utilization of care regardless of ethnicity and differences were found by race in health care expenditures. It is important to note that the demographic characteristics of the sample indicated that most individuals had lower incomes, lower education, and were unemployed. These characteristics constitute a lower SES sample and research has shown that individuals lower in

education experience discrimination in health care settings (IOM, 2002). Among Hispanics, low utilization was compounded by lower expenditures for health care. Even with the limitations posed by the survey, it seems clear that for these insured Hispanic individuals, as well as for African Americans and Caucasians, care was far below the profession's standards for type 2 diabetes.

Future Directions

Many researchers and legislators have suggested providing universal access to care (i.e., universal or expanded health insurance; Monheit & Vistnes, 2000), in order to alleviate the problems associated with the inverse relationship between SES and health (Anderson & Armstead, 1995). Universal health insurance sounds like a logical solution to the problems of the uninsured; however, research has indicated access does not equal utilization. In addition, for racial minorities, health care utilization is lower even when social class is controlled (Williams & Collins, 1995). As in the present study when insurance coverage is comparable, some aspects of care are lower in Hispanics and African Americans than Caucasians.

Zuvekas and Weinick (1999) proffer that increasing health insurance coverage would probably improve access to care for Hispanics. However, the current study as well as others has found having insurance coverage does not appear to be enough to eliminate the current disparities (Adler et al., 1993; Bashshur, Homan, & Smith, 1994; Mainous, Hueston, Love, & Griffith, 1999; Shi, 2000). In fact, Sox, Swartz, Burstin, and Brennan (1998) demonstrated that having a regular physician is a more powerful predictor of health care utilization than insurance status. Consequently, having access to care via health insurance does not lead an individual to use that care in a timely and appropriate

manner. There are a number of other factors (e.g., culture, psychological access, beliefs, attitudes, etc.) that impinge on use of health care services and increasing insurance coverage in order to increase health care access is a complex and multi-faceted issue. Health insurance does not insure quality of care or physical health (Eisenberg & Power, 2000).

Confronting Health Disparities

In order to understand health disparities, the disparities must continue to be documented among comparably insured individuals. Delayed health care seeking and decreased utilization of health care services among ethnic minorities for preventable and treatable disease (e.g., diabetes) constitutes a serious impact on both the cost of health care and the disproportionate burden of disease for these individuals. Thus, delineating and understanding the influences on delayed care seeking and underutilization of accessible care are of vital importance in future research. Beginning to examine the health beliefs, attitudes, as well as cultural factors that may impact utilization among all groups is needed. Realizing that the “one size does fit all” approach (Sbrocco et al., 1999) will ultimately not work in the area of health disparities is paramount. In addition, conducting research that embraces the differences of minority groups and uses these differences in beliefs and attitudes to promote health should be the direction of future research initiatives (IOM, 2002).

In this sample it was documented that there was an overall low level of utilization. This finding may indicate that there maybe a need for new approaches for diabetic patients. If individuals are going less than one time per year, maybe it calls for establishing comprehensive diabetic care centers or clinics in local communities, the one

visit as a point of intervention for many of the services recommended. For example, if the patient comes once per year, setting up appointments with most health professionals (i.e., nurse educator, podiatrist, eye doctor, etc.) for that one visit can be accomplished in one setting. The one visit could be seen as a “teachable” moment for the patient to begin to understand the importance of the “health care team” approach for the long-term management of this disease.

In addition, ethnic (i.e., Hispanics) differences in expenditures point to the fact that health insurance status does not guarantee equity of care for all patients. Less money spent on total health expenses and out-of-pocket expenses in African Americans and Hispanics despite no difference in the number of visits is potentially a problem. The exact set of factors contributing to this needs to be explored. The present findings highlight the importance of income level despite insurance on the amount and type of care received for low-income diabetics. Ensuring that all individuals receive quality care, irrespective of income and ethnicity, should continue to be a goal of health care in the United States.

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Table 1

Demographic Characteristics of Participants by Race/Ethnicity (N= 506)

	Caucasian American (n=292)	African American (n=96)	Hispanic American (n=118)
Ethnicity % of sample	57.7	19.0	23.3
Males	138	34	54
Females	154	62	64
Age (in years)	50.99(.59)	51.31(.98)	49.64(1.50)

Table 2

Age Categories by Race/Ethnicity (N=506)

Age (in years)	Caucasian American (n=292)		African American (n=96)		Hispanic American (n=118)	
	#	%	#	%	#	%
21-29	10	4	1	1	6	6
30-39	28	9	9	12	11	13
40-49	70	24	21	22	34	24
50-59	118	40	43	43	51	39
60-64	66	23	22	23	16	18

$\chi^2(8)=105.81$, $p=.85$, ns

Table 3

Type of Insurance Coverage by Race/Ethnicity among Insured Type 2 Diabetics

Health Insurance Type	Caucasian Americans (<u>n</u> =292)		African Americans (<u>n</u> =96)		Hispanic Americans (<u>n</u> =118)	
	#	%	#	%	#	%
Private	225	84	54	60	68	64
Public	67	16	42	40	50	36

 $\chi^2(2)=1099.38, p<.05, p=.00$

Table 4

Type of Insurance Coverage by Gender among Insured Type 2 Diabetics

Health Insurance Type	Males (<u>n</u> =226)		Females (<u>n</u> =280)	
	#	%	#	%
Private	176	84	171	71
Public	50	16	109	29

$\chi^2(1)=522.29, p<.05, p=.00$

Table 5

Insurance Type Among Males by Race/Ethnicity(n=226)

Insurance Type	Caucasian American (n=138)		African American (n=34)		Hispanic American (n=54)	
	#	%	#	%	#	%
Private	113	87	24	73	39	79
Public	25	13	10	27	15	21

 $\chi^2(2)=420.52, p<.05$

Table 6

Insurance Type Among Females by Race/Ethnicity(n=280)

Insurance Type	Caucasian American (n=154)		African American (n=62)		Hispanic American (n=64)	
	#	%	#	%	#	%
Private	112	80	30	52	29	54
Public	42	20	32	48	35	46

 $\chi^2(2)=1564.41, p<.05$

Table 7

Marital Status Among Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Marital Status	Caucasian Americans (<u>n</u> =292)		African Americans (<u>n</u> =96)		Hispanic Americans (<u>n</u> =118)	
	#	%	#	%	#	%
Married	187	66	40	36	71	57
Widowed	19	6	10	9	9	8
Divorced	42	13	21	27	15	13
Separated	8	2	5	6	9	8
Never Married	36	12	20	23	14	14

$\chi^2(8)=1077.41, p<.05, p=.00$

Table 8

Martial Status Among Privately Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Martial Status	Caucasian Americans (<u>n</u> =225)		African Americans (<u>n</u> =54)		Hispanic Americans (<u>n</u> =68)	
	#	%	#	%	#	%
Married	162	74	31	23	46	62
Widowed	12	5	3	6	4	6
Divorced	23	10	9	23	8	15
Separated	4	1	2	5	1	1
Never Married	24	10	9	18	9	16

$\chi^2(8)=495.20, p<.05, p=.04$

Table 9

Martial Status Among Publicly Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Martial Status	Caucasian Americans (n=67)		African Americans (n=42)		Hispanic Americans (n=50)	
	#	%	#	%	#	%
Married	25	28	9	17	25	46
Widowed	7	13	7	12	5	13
Divorced	19	30	12	34	7	11
Separated	4	6	3	7	8	20
Never Married	12	23	11	30	5	10

 $\chi^2(8)=1824.10, p=.17$

Table 10

Highest Degree Achieved Among Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Highest Degree	Caucasian Americans (<u>n</u> =292)		African Americans (<u>n</u> =96)		Hispanic Americans (<u>n</u> =118)	
	#	%	#	%	#	%
No Degree	56	15	41	42	58	44
GED	21	6	8	7	5	3
High School	150	55	31	31	41	34
Bachelors	26	11	6	7	9	15
Masters	14	4	5	6	3	2
Doctorate	4	1	1	1	1	1
Other	21	7	4	6	1	1

 $\chi^2(12)=1816.42, p<.05, p=.00$

Table 11

Highest Degree Achieved among Privately Insured by Race/Ethnicity (n=347)

Highest Degree	Caucasian American (n=225)		African American (n=54)		Hispanic American (n=68)	
	#	%	#	%	#	%
No Degree	23	10	13	22	23	25
GED	12	5	6	11	1	1
High School	130	60	21	39	32	47
Bachelors	23	11	4	8	9	23
Masters	14	5	5	9	1	1
Doctorate	4	1	1	1	1	1
Other	19	8	4	9	1	1

 $\chi^2(12)=835.30, p<.05$

Table 12

Employment Status by Race/ethnicity among Insured Type 2 Diabetics

Employment Status	Caucasian Americans (<u>n</u> =292)		African Americans (<u>n</u> =96)		Hispanic Americans (<u>n</u> =118)	
	#	%	#	%	#	%
Employed	171	64	44	46	59	58
Unemployed	121	36	52	54	59	42

$\chi^2(2)=332.73, p<.05, p=.01$

Table 13

Employment Status among Males by Race/Ethnicity (n=226)

Employment Status	Caucasian American (n=138)		African American (n=34)		Hispanic American (n=54)	
	#	%	#	%	#	%
Employed	92	71	17	47	35	68
Unemployed	46	29	17	53	19	32

 $\chi^2(2)=519.09, p<.05$

Table 14

Employment Status among Females by Race/Ethnicity (n=280)

Employment Status	Caucasian American (n=154)		African American (n=62)		Hispanic American (n=64)	
	#	%	#	%	#	%
Employed	79	58	27	45	24	50
Unemployed	75	42	35	55	40	50

 $\chi^2(2)=189.86, p=.26$

Table 15

Employment Status by Race/ethnicity among Privately Insured Type 2 Diabetics

Employment Status	Caucasian Americans (<u>n</u> =225)		African Americans (<u>n</u> =54)		Hispanic Americans (<u>n</u> =68)	
	#	%	#	%	#	%
Employed	163	73	40	74	49	73
Unemployed	62	27	14	26	19	27

$\chi^2(2)=0.68$, $p=.99$, n.s.

Table 16

Employment Status by Race/ethnicity among Publicly Insured Type 2 Diabetics

Employment Status	Caucasian Americans (<u>n</u> =67)		African Americans (<u>n</u> =42)		Hispanic Americans (<u>n</u> =50)	
	#	%	#	%	#	%
Employed	8	20	4	4	10	30
Unemployed	59	80	38	96	40	70

 $\chi^2(2)=1002.69, p<.05$

Table 17

Occupational Type Among Employed Caucasians and Ethnic Minorities with Type 2 Diabetes

Occupational Type	Caucasian Americans (n=175)		African Americans (n=45)		Hispanic Americans (n=61)	
	#	%	#	%	#	%
Professional & Technical	30	18	7	12	9	12
Managerial, Administrative	29	17	1	1	6	8
Sales Worker	17	11	4	8	4	11
Clerical & Kindred Workers	23	12	12	32	8	14
Craftsmen & Foremen	11	6	1	0	6	1
Operatives	9	5	4	7	7	10
Transport Operatives	12	8	2	6	2	5
Service Workers	35	19	13	31	13	23
Laborers, not farming	7	3	0*	0*	4	1
Farm Owners and Managers	2	1	0*	0*	0*	0*
Farm Laborers and Foremen	0*	0*	0*	0*	1	6
Unclassifiable occupation	0*	0*	1	3	1	1

$\chi^2(22)=1831.25, p<.05, p=.01$

Note*Pearson's statistic accounts for sparse and non-sparse tables (STATA 7.0 Manual, 2001)

Table 18

Employment and Income Characteristics of Participants by Race/Ethnicity (N=506)

	Caucasian American (n=292)	African American (n=96)	Hispanic American (n=118)
Employment Status (%)			
Employed	64	46	58
Unemployed	36	54	42
Total Income (in \$)	25,006 (1,550)	15,852 (1,284)	19,843 (2,608)
Wage Income (in \$)	19,321(1,446)	9,853 (1,524)	14,206 (2,348)
Unemployment Compensation Income (in \$)	72(34)	26(18)	77 (46)
Pension Income (in \$)	1,196(262)	1,195(513)	550(420)
Social Security Income (in \$)	1,676(244)	2,391(538)	1,273(292)
Public Assistance Income (in \$)	71(30)	272(118)	191(88)

Table 19

Family Income as a Percent of Poverty Line Among Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Poverty Category	Caucasian Americans (<u>n</u> =292)		African Americans (<u>n</u> =96)		Hispanic Americans (<u>n</u> =118)	
	#	%	#	%	#	%
Negative or near poor	37	12	26	25	25	29
Near poor	12	2	7	9	13	7
Low	36	12	24	30	20	12
Middle	101	36	25	23	34	26
High	106	39	14	13	26	27

 $\chi^2(8)=2756.25, p<.05, p=.00$

Table 20

Family Income as a Percent of Poverty Line Among Privately Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Poverty Category	Caucasian Americans (<u>n</u> =225)		African Americans (<u>n</u> =54)		Hispanic Americans (<u>n</u> =68)	
	#	%	#	%	#	%
Negative or near poor	14	6	4	9	4	14
Near Poor	5	1	3	10	4	5
Low	27	12	13	27	10	12
Middle	82	37	20	32	27	31
High	97	44	14	21	23	38

 $\chi^2(8)=1063.41, p<.05, p=.00$

Table 21

Family Income as a Percent of Poverty Line Among Publicly Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Poverty Category	Caucasian Americans (<u>n</u> =67)		African Americans (<u>n</u> =42)		Hispanic Americans (<u>n</u> =50)	
	#	%	#	%	#	%
Negative or near poor	23	40	22	49	21	56
Near Poor	7	7	4	8	9	11
Low	9	12	11	35	10	11
Middle	19	28	5	8	7	16
High	9	13	0	0	3	6

$\chi^2(8)=3533.88, p<.05, p=.02$

Table 22

Family Income as a Percent of Poverty Line Among Insured Men and Women w/ Type 2 Diabetes

Poverty Category	Men (<u>n</u> =226)		Women (<u>n</u> =280)	
	#	%	#	%
Negative or near poor	27	12	61	20
Near Poor	13	3	19	5
Low	34	14	46	16
Middle	69	30	91	34
High	83	42	63	25

$\chi^2(4)=970.59, p<.05, p=.01$

Table 23

Census Region Among Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Census Region	Caucasian Americans (<u>n</u> =289)		African Americans (<u>n</u> =93)		Hispanic Americans (<u>n</u> =116)	
	#	%	#	%	#	%
Northeast	56	20	15	19	17	15
Midwest	72	25	13	19	8	9
South	123	41	56	55	44	38
West	38	13	9	7	47	39

$\chi^2(6)=1623.32, p<.05, p=.00$

Table 24

Census Region Among Privately Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Census Region	Caucasian Americans (<u>n</u> =223)		African Americans (<u>n</u> =53)		Hispanic Americans (<u>n</u> =68)	
	#	%	#	%	#	%
Northeast	43	20	9	21	7	11
Midwest	56	24	5	12	3	6
South	97	42	33	58	28	41
West	27	14	6	8	30	41

$\chi^2(6)=1123.66, p<.05, p=.00$

Table 25

Census Region Among Publicly Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Census Region	Caucasian Americans (<u>n</u> =66)		African Americans (<u>n</u> =40)		Hispanic Americans (<u>n</u> =48)	
	#	%	#	%	#	%
Northeast	13	20	6	15	10	22
Midwest	16	29	8	30	5	14
South	26	41	23	49	16	30
West	11	11	3	5	17	34

 $\chi^2(6)=2229.55, p=.10$

Table 26

Health Status Among Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Health Status	Caucasian Americans (<u>n</u> =291)		African Americans (<u>n</u> =94)		Hispanic Americans (<u>n</u> =118)	
	#	%	#	%	#	%
Excellent	11	4	9	13	7	7
Very Good	50	20	10	11	16	17
Good	91	34	35	36	46	39
Fair	82	26	23	25	30	23
Poor	57	16	17	15	19	14

$\chi^2(8)=591.74$, $p>.05$, $p=.22$, n.s.

Table 27

Perceived Self-reported Mental Health Status Among Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Mental Health Status	Caucasian Americans (<u>n</u> =291)		African Americans (<u>n</u> =94)		Hispanic Americans (<u>n</u> =118)	
	#	%	#	%	#	%
Excellent	58	24	21	25	40	41
Very Good	84	28	22	21	21	20
Good	95	32	29	29	40	27
Fair	33	11	17	19	12	8
Poor	21	4	5	6	5	4

$\chi^2(8)=584.07$, $p>.05$, $p=.18$, n.s.

Table 28

Health Status by Gender for Insured Type 2 Diabetics (n=506)

Health Status	Males (<u>n</u> =17)		Females (<u>n</u> =48)	
	#	%	#	%
Excellent	16	7	11	5
Very Good	36	18	40	18
Good	79	36	93	34
Fair	53	23	82	27
Poor	41	15	52	16

 $\chi^2(4)=94.58, p=.84$

Table 29

Health Status by Type of Insurance Coverage among Insured Type 2 Diabetics

Health Status	Private Insurance (<u>n</u> =346)		Public Insurance (<u>n</u> =157)	
	#	%	#	%
Excellent	21	7	6	4
Very Good	67	21	9	7
Good	138	39	34	21
Fair	79	22	56	36
Poor	41	11	52	32

$\chi^2(4)=2033.22, p<.05, p=.00$

Table 30

Health Status by Age Category for Insured Type 2 Diabetics

Health Status	21-29 years (<u>n</u> =17)		30-39 years (<u>n</u> =48)		40-49 years (<u>n</u> =125)		50-59 years (<u>n</u> =211)		60-64 years (<u>n</u> =102)	
	#	%	#	%	#	%	#	%	#	%
Excellent	1	4	5	12	12	10	3	13	6	9
Very Good	5	43	8	17	25	23	25	14	13	16
Good	7	31	18	47	45	37	73	35	29	28
Fair	2	17	12	17	25	16	60	27	36	37
Poor	2	4	5	6	18	14	50	23	18	11

$\chi^2(16)=1408.09, p<.05, p=.00$

Table 31

Perceived Self-reported Mental Health Status Among Privately Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Mental Health Status	Caucasian Americans (<u>n</u> =225)		African Americans (<u>n</u> =53)		Hispanic Americans (<u>n</u> =68)	
	#	%	#	%	#	%
Excellent	55	29	14	32	24	41
Very Good	71	29	17	27	16	27
Good	71	31	17	30	25	29
Fair	21	9	5	11	3	3
Poor	7	2	0	0	0	0

$\chi^2(8)=214.15, p=.71, n.s.$

Table 32

Perceived Self-reported Mental Health Status by Race Among Publicly Insured Type 2 Diabetics

Mental Health Status	Caucasians Americans (n=66)		African Americans (n=41)		Hispanics Americans (n=50)	
	#	%	#	%	#	%
Excellent	3	3	7	15	16	40
Very Good	13	24	5	12	5	8
Good	24	37	12	27	15	22
Fair	12	20	12	31	9	18
Poor	14	16	5	15	5	12

$\chi^2(8)=4261.73, p<.05, p=.01$

Table 33

Perceived Self-reported Mental Health Status by Age Category Among Insured Type 2 Diabetics

Mental Health Status	21-29 years (<u>n</u> =17)		30-39 years (<u>n</u> =48)		40-49 years (<u>n</u> =125)		50-59 years (<u>n</u> =211)		60-64 years (<u>n</u> =102)	
	#	%	#	%	#	%	#	%	#	%
Excellent	8	48	15	37	32	23	42	24	22	27
Very Good	3	27	8	12	37	31	55	28	24	24
Good	5	25	15	36	32	28	74	29	38	36
Fair	0	0	4	6	19	16	25	13	14	11
Poor	1	0	6	10	5	2	15	7	4	2

$\chi^2(16)=722.11, p=.24, n.s.$

Table 34

Intercorrelations Between Variables Controlled for in Analyses

Variables	1	2	3	4	5	6	7	8	9
1. Age	--								
2. Educyr	-0.13	--							
3. Famsze98	-0.40	-0.07	--						
4. Ttlp98x	0.12	0.37	-0.10	--					
5. Inscov98	0.20	-0.36	-0.03	-0.25	--				
6. Emplstat	0.38	-0.34	-0.11	-0.34	0.44	--			
7. Povcat98	0.06	0.36	-0.07	0.49	-0.46	-0.31	--		
8. Hideg	-0.02	0.73**	-0.09	0.35	-0.30	-0.30	0.33	--	
9. Marry	-0.44	-0.08	-0.03	-0.21	0.13	0.03	-0.19	-0.16	--

Note* All coefficients are significant at $p < .05$. Educyr = years of education; Famsze98 = Family size; Ttlp98x = Person's total income in 1998; Emplstat = employment status; Povcat98 = Family's income as a percent of poverty line; Hideg = highest degree achieved; Marry = marital status.

** High intercorrelation-Educyr dropped from analyses.

Table 35

Regression Analysis Summary Relating Dummy Coded Race/ethnicity to Total Outpatient Visits after Adjusting for Demographic Variables

Variable (units)	Coeff.	t	p-value	95% CI
Age (in years)	.01	.29	.77	-.01-.01
Family Size (persons)	-.06	-1.92	.06	-.12-.00
Insurance (type)	.29	2.25	.03	.04-.55
Annual Income (in \$)	-.00	.97	.33	-.00-.00
Employment (yes/no)	.15	1.23	.22	-.09-.38
Poverty Status (level)	.05	1.15	.25	-.04-.14
Highest Degree (type)	.01	.12	.90	-.08-.09
Marital Status (M/W/D/S/NM)	-.04	-1.14	.25	-.11-.03
African Americans	.04	.24	.81	-.29-.38
Hispanics	.02	.14	.89	-.27-.31
Caucasians (reference category)	----	----	----	-----
Constant	-2.58	-4.75	.00	-3.65- -1.51

Note. $R^2 = .03$ ($N = 506$, $p = .06$); M=married, W=widowed, D=divorced, S=separated, NM=never married. Also, dependent variable has been log transformed, so coefficients should be interpreted as changes on a log scale.

Table 36

Regression Analysis Summary Relating Dummy Coded Race/ethnicity to Optometrist Visits after Adjusting for Demographic Variables

Variable (units)	Coeff.	t	p-value	95% CI
Age (in years)	.00	.79	.43	-.00-.01
Family Size (persons)	.00	.16	.89	-.04-.05
Insurance (type)	.02	.18	.86	-.24-.28
Annual Income (in \$)	-.00	-1.22	.22	-.00-.00
Employment (yes/no)	-.06	-.56	.57	-.29-.15
Poverty Status (level)	-.01	-.20	.84	-.09-.07
Highest Degree (type)	-.00	.22	.82	-.04-.05
Marital Status (M/W/D/S/NM)	-.02	.98	.33	-.29-.07
African Americans	-.10	-1.11	.27	-.29-.08
Hispanic	-.17	-2.04	.04	-.33-.01
Caucasians (reference category)	----	----	----	-----
Constant	-2.18	-5.68	.00	-2.94- -1.43

Note. $R^2 = .01$ ($N = 506$, $p = .78$); M=married, W=widowed, D=divorced, S=separated, NM=never married. Also, dependent variable has been log transformed, so coefficients should be interpreted as changes on a log scale.

Table 37

Regression Analysis Summary Relating Dummy Coded Race/ethnicity to Total health Expenditures after Adjusting for Demographic Variables

Variable (units)	Coeff.	t	p-value	95% CI
Age (in years)	.01	1.06	.29	-.01-.03
Family Size (persons)	-.09	-1.54	.12	-.21-.02
Insurance (type)	.23	1.01	.31	-.22-.68
Annual Income (in \$)	-.00	.13	.90	-.00-.00
Employment (yes/no)	.53	2.52	.01	-.12-.94
Poverty Status (level)	.05	.74	.46	-.09-.19
Highest Degree (type)	.06	1.30	.20	-.03-.15
Marital Status (M/W/D/S/NM)	-.00	-.04	.97	-.11-.10
African Americans	-.58	-2.28	.02	-1.09- -.08
Hispanic	-.55	-2.90	.00	-.92-.18
Caucasians (reference category)	----	----	----	-----
Constant	6.14	7.84	.00	4.61-7.69

Note. $R^2 = .10$ ($N = 498$, $p < .01$); M=married, W=widowed, D=divorced, S=separated, NM=never married. Also, dependent variable has been log transformed, so coefficients should be interpreted as changes on a log scale.

Table 38

Regression Analysis Summary Relating Dummy Coded Race/ethnicity to Total Amount Spent Out-of-Pocket after Adjusting for Demographic Variables

Variable (units)	Coeff.	t	p-value	95% CI
Age (in years)	.02	2.63	.01	.01-.04
Family Size (persons)	-.07	-1.48	.14	-.16-.02
Insurance (type)	-.33	-1.80	.07	-.69-.03
Annual Income (in \$)	-.00	-.28	.78	-.00-.00
Employment (yes/no)	.18	.91	.36	-.20-.55
Poverty Status (level)	.03	.61	.54	-.07-.14
Highest Degree(type)	.01	.34	.73	-.06-.09
Marital Status (M/W/D/S/NM)	.03	.71	.48	-.06-.13
African Americans	-.39	-2.24	.03	-.73-.05
Hispanic	-.30	-1.84	.07	-.62-.02
Caucasians (reference category)	----	----	----	-----
Constant	5.21	8.84	.00	4.05-6.37

Note. $R^2 = .09$ ($N = 495$, $p < .01$); M=married, W=widowed, D=divorced, S=separated, NM=never married. Also, dependent variable has been log transformed, so coefficients should be interpreted as changes on a log scale.

Table 39

Time Since Last Received Blood Pressure Check Among Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Blood Pressure Check	Caucasian Americans (<u>n</u> =292)		African Americans (<u>n</u> =96)		Hispanic Americans (<u>n</u> =118)	
	#	%	#	%	#	%
< 1 year	272	93	88	90	102	91
>1 year	20	7	8	10	16	9

$\chi^2(2)=54.51, p>.05, p=.53, n.s.$

Table 40

Time Since Last Blood Pressure Check by Age Category for Insured Type 2 Diabetics

Blood Pressure Check	21-29 years (<u>n</u> =17)		30-39 years (<u>n</u> =48)		40-49 years (<u>n</u> =125)		50-59 years (<u>n</u> =211)		60-64 years (<u>n</u> =102)	
	#	%	#	%	#	%	#	%	#	%
< 1 year	15	95	43	91	119	95	192	91	93	92
>1 year	2	5	5	9	6	5	20	9	11	8

 $\chi^2(4)=57.15, p=.73$

Table 41

Time Since Last Received Blood Pressure Check Among Privately Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Blood Pressure Check	Caucasian Americans (n=225)		African Americans (n=54)		Hispanic Americans (n=68)	
	#	%	#	%	#	%
< 1 year	210	93	49	89	60	91
>1 year	15	7	5	11	8	9

$\chi^2(2)=48.58, p=.51, n.s.$

Table 42

Time Since Last Received Blood Pressure Check Among Publicly Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Blood Pressure Check	Caucasian Americans (<u>n</u> =67)		African Americans (<u>n</u> =42)		Hispanic Americans (<u>n</u> =50)	
	#	%	#	%	#	%
< 1 year	62	94	39	92	42	90
>1 year	5	6	3	8	8	10

$\chi^2(2)=15.21$, $p>.05$, $p=.83$, n.s.

Table 43

Time Since Last Blood Pressure Check by Gender for Insured Type 2 Diabetics (n=506)

Blood Pressure Check	Males (<u>n</u> =226)		Females (<u>n</u> =280)	
	#	%	#	%
< 1 year	197	89	265	96
>1 year	29	11	15	4

$\chi^2(1)=429.81, p<.05, p=.02$

Table 44

Time Since Last Received Cholesterol Check Among Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Cholesterol Check	Caucasian Americans (<u>n</u> =292)		African Americans (<u>n</u> =96)		Hispanic Americans (<u>n</u> =118)	
	#	%	#	%	#	%
< 1 year	232	78	76	80	90	77
>1 year	60	22	20	20	28	23

$\chi^2(2)=8.58$, $p>.05$, $p=.91$, n.s.

Table 45

Time Since Last Cholesterol Check by Age Category for Insured Type 2 Diabetics

Cholesterol Check	21-29 years (<u>n</u> =17)		30-39 years (<u>n</u> =48)		40-49 years (<u>n</u> =125)		50-59 years (<u>n</u> =211)		60-64 years (<u>n</u> =102)	
	#	%	#	%	#	%	#	%	#	%
< 1 year	10	66	35	72	91	70	175	82	87	84
>1 year	7	34	13	28	34	30	37	18	17	16

 $\chi^2(4)=301.09, p=.15$

Table 46

Time Since Last Cholesterol Check by Gender for Insured Type 2 Diabetics (n=506)

Cholesterol Check	Males (<u>n</u> =226)		Females (<u>n</u> =280)	
	#	%	#	%
< 1 year	168	75	230	81
>1 year	58	25	50	19

 $\chi^2(1)=151.54, p=.17$

Table 47

Time Since Last Received Cholesterol Check Among Privately Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Cholesterol Check	Caucasian Americans (<u>n</u> =225)		African Americans (<u>n</u> =54)		Hispanic Americans (<u>n</u> =68)	
	#	%	#	%	#	%
< 1 year	182	78	43	82	51	78
>1 year	43	22	11	18	17	22

$\chi^2(2)=13.11$, $p=.82$, n.s.

Table 48

Time Since Last Received Cholesterol Check Among Publicly Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Cholesterol Check	Caucasian Americans (<u>n</u> =67)		African Americans (<u>n</u> =42)		Hispanic Americans (<u>n</u> =50)	
	#	%	#	%	#	%
< 1 year	50	75	33	78	39	77
>1 year	17	25	9	23	11	23

$\chi^2(2)=2.97$, $p>.05$, $p=.97$, n.s.

Table 49

Time Since Last Physical Exam Among Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Physical Exam	Caucasian Americans (<u>n</u> =292)		African Americans (<u>n</u> =96)		Hispanic Americans (<u>n</u> =118)	
	#	%	#	%	#	%
< 1 year	206	71	74	75	81	76
>1 year	86	29	22	25	37	24

$\chi^2(2)=58.79$, $p>.05$, $p=.48$, n.s.

Table 50

Time Since Last Physical Exam by Gender for Insured Type 2 Diabetics (n=506)

Physical Exam	Males (<u>n</u> =226)		Females (<u>n</u> =280)	
	#	%	#	%
< 1 year	156	69	205	75
>1 year	70	31	75	25

 $\chi^2(1)=87.82, p=.30$

Table 51

Time Since Last Physical Exam Among Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Physical Exam	Caucasian Americans (<u>n</u> =225)		African Americans (<u>n</u> =54)		Hispanic Americans (<u>n</u> =68)	
	#	%	#	%	#	%
< 1 year	158	70	41	73	46	75
>1 year	67	30	13	27	22	25

 $\chi^2(2)=23.75, p=.71, n.s$

Table 52

Time Since Last Received Physical Exam Among Publicly Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Physical Exam	Caucasian Americans (<u>n</u> =67)		African Americans (<u>n</u> =42)		Hispanic Americans (<u>n</u> =50)	
	#	%	#	%	#	%
< 1 year	48	75	33	79	35	77
>1 year	19	25	9	21	15	23

$\chi^2(2)=8.19$, $p>.05$, $p=.86$, n.s.

Table 53

Time Since Last Physical Exam by Age Category for Insured Type 2 Diabetics

Physical Exam	21-29 years (<u>n</u> =17)		30-39 years (<u>n</u> =48)		40-49 years (<u>n</u> =125)		50-59 years (<u>n</u> =211)		60-64 years (<u>n</u> =102)	
	#	%	#	%	#	%	#	%	#	%
< 1 year	13	85	34	76	78	60	159	77	77	72
>1 year	4	15	14	24	47	40	53	23	27	28

 $\chi^2(4)=351.92, p<.05$

Table 54

Time Since Last Received Influenza Vaccination Among Caucasians and Ethnic Minorities with Type 2 Diabetes

Influenza Vaccination	Caucasian Americans (<u>n</u> =292)		African Americans (<u>n</u> =96)		Hispanic Americans (<u>n</u> =118)	
	#	%	#	%	#	%
< 1 year	142	49	35	35	50	45
>1 year	150	51	61	65	68	55

$\chi^2(2)=248.59$, $p>.05$, $p=.07$, n.s.

Table 55

Time Since Last Influenza Vaccination by Gender

Influenza Vaccination	Males (<u>n</u> =226)		Females (<u>n</u> =280)	
	#	%	#	%
< 1 year	101	44	126	48
>1 year	125	56	154	52

$\chi^2(1)=47.52, p=.43, \text{ n.s.}$

Table 56

Time Since Last Influenza Vaccination by Age Category for Insured Type 2 Diabetics

Influenza Vaccination	21-29 years (<u>n</u> =17)		30-39 years (<u>n</u> =48)		40-49 years (<u>n</u> =125)		50-59 years (<u>n</u> =211)		60-64 years (<u>n</u> =102)	
	#	%	#	%	#	%	#	%	#	%
< 1 year	3	41	17	34	57	47	94	44	56	57
>1 year	14	59	31	66	68	53	118	56	48	43

 $\chi^2(4)=229.31, p=.25$

Table 57

Time Since Last Received Influenza Vaccination Among Privately Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Influenza Vaccination	Caucasian Americans (<u>n</u> =225)		African Americans (<u>n</u> =54)		Hispanic Americans (<u>n</u> =68)	
	#	%	#	%	#	%
< 1 year	114	51	20	40	28	50
>1 year	111	49	34	60	40	50

$\chi^2(2)=80.85, p=.38, \text{ n.s.}$

Table 58

Time Since Last Received Influenza Vaccination Among Publicly Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Influenza Vaccination	Caucasian Americans (<u>n</u> =67)		African Americans (<u>n</u> =42)		Hispanic Americans (<u>n</u> =50)	
	#	%	#	%	#	%
< 1 year	28	41	15	29	22	36
>1 year	39	59	27	71	28	64

$\chi^2(2)=62.84$, $p>.05$, $p=.41$, n.s.

Table 59

Given Nutritional Advice Among Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Nutritional Advice	Caucasian Americans (<u>n</u> =292)		African Americans (<u>n</u> =96)		Hispanic Americans (<u>n</u> =118)	
	#	%	#	%	#	%
Yes	9	3	1	2	2	2
No	283	97	95	98	116	98

$\chi^2(2)=5.55$, $p>.05$, $p=.91$, n.s.

Table 60

Received Nutritional Advice By Gender Among Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Nutritional Advice	Males (<u>n</u> =226)		Females (<u>n</u> =280)	
	#	%	#	%
Yes	2	1	10	4
No	224	99	270	96

$\chi^2(1)=197.20$, $p=.14$, n.s.

Table 61

Given Nutritional Advice Among Privately Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Nutritional Advice	Caucasian Americans (<u>n</u> =225)		African Americans (<u>n</u> =54)		Hispanic Americans (<u>n</u> =68)	
	#	%	#	%	#	%
Yes	5	2	1	4	1	2
No	220	98	53	96	67	98

$\chi^2(2)=24.84$, $p=.73$, n.s.

Table 62

Given Nutritional Advice Among Publicly Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Nutritional Advice	Caucasian Americans (<u>n</u> =67)		African Americans (<u>n</u> =42)		Hispanic Americans (<u>n</u> =50)	
	#	%	#	%	#	%
Yes	4	5	0	0	1	1
No	63	95	42	100	49	99

$\chi^2(2)=505.44$, $p=.13$, n.s.

Table 63

Regression Analysis Summary Relating Dummy Coded Race/ethnicity to Dental Care Expenditures after Adjusting for Demographic Variables

Variable (units)	Coeff.	t	p-value	95% CI
Age (in years)	.03	1.03	.30	-.02-.07
Family Size (persons)	.13	.89	.37	-.16-.43
Insurance (type)	-.38	-.66	.51	-1.54-.78
Annual Income (in \$)	-.00	-.25	.80	-.00-.00
Employment (yes/no)	-.47	-.74	.46	-1.72-.78
Poverty Status (level)	.27	1.19	.24	-.18-.73
Highest Degree (type)	.73	4.62	.00	.42-1.05
Marital Status (M/W/D/S/NM)	.14	.92	.34	-.16-.43
African Americans	-.51	-.83	.41	-1.72-.69
Hispanic	-.42	-.80	.43	-1.44-.61
Caucasians (reference category)	----	----	----	-----
Constant	-5.18	-2.67	.01	-9.00- -1.37

Note. $R^2 = .10$ ($N = 506$, $p < .01$); M=married, W=widowed, D=divorced, S=separated, NM=never married. Also, dependent variable has been log transformed, so coefficients should be interpreted as changes on a log scale.

Table 64

Time Since Last Dental Check-up Among Insured Caucasians and Ethnic Minorities with Type 2 Diabetes

Dental Check-up	Caucasian Americans (<u>n</u> =292)		African Americans (<u>n</u> =96)		Hispanic Americans (<u>n</u> =118)	
	#	%	#	%	#	%
< 1 year	87	35	20	19	27	26
>1 year	205	65	76	81	91	74

 $\chi^2(2)=444.58, p<.05, p=.01$

Table 65

Time Since Last Dental Exam Among Privately Insured Type 2 Diabetics

Dental Exam	Caucasian Americans (<u>n</u> =225)		African Americans (<u>n</u> =54)		Hispanic Americans (<u>n</u> =68)	
	#	%	#	%	#	%
< 1 year	78	39	13	24	18	28
>1 year	147	61	41	76	50	72

$\chi^2(2)=330.90$, $p=.09$, n.s.

Table 66

Time Since Last Dental Exam Among Publicly Insured Type 2 Diabetics

Dental Exam	Caucasian Americans (<u>n</u> =67)		African Americans (<u>n</u> =42)		Hispanic Americans (<u>n</u> =50)	
	#	%	#	%	#	%
< 1 year	9	16	7	11	9	23
>1 year	58	84	35	89	41	77

$\chi^2(2)=273.06$, $p=.45$, n.s.

Table 67

Regression Analysis Summary Relating Dummy Coded Race/ethnicity to Total Prescription Medications after Adjusting for Demographic Variables

Variable (units)	Coeff.	t	p-value	95% CI
Age (in years)	.02	2.06	.04	.00-.04
Family Size (persons)	-.15	-2.50	.01	-.26-.03
Insurance (type)	-.34	2.04	.04	.01-.78
Annual Income (in \$)	-.00	-.00	-.59	-.00-.00
Employment (yes/no)	.21	1.22	.22	-.13-.56
Poverty Status (level)	.04	.61	.54	-.08-.16
Highest Degree (type)	-.02	-.53	.60	-.11-.06
Marital Status (M/W/D/S/NM)	-.09	-1.36	.18	-.22-.04
African Americans	-.26	-1.27	.21	-.65-.14
Hispanic	-.46	-1.80	.07	-.95-.04
Caucasians (reference category)	----	----	----	-----
Constant	1.74	2.80	.01	.52-2.96

Note. $R^2 = .12$ ($N = 506$, $p < .01$); M=married, W=widowed, D=divorced, S=separated, NM=never married. Also, dependent variable has been log transformed, so coefficients should be interpreted as changes on a log scale.

Table 68

Regression Analysis Summary Relating Dummy Coded Race/ethnicity to Total Prescription Expenditures after Adjusting for Demographic Variables

<u>Variable (units)</u>	<u>Coeff.</u>	<u>t</u>	<u>p-value</u>	<u>95% CI</u>
Age (in years)	.02	1.32	.19	-.01-.06
Family Size (persons)	-.27	-2.57	.01	-.48- -.06
Insurance (type)	-.46	1.26	.21	-.26-1.20
Annual Income (in \$)	-.00	-1.06	.29	-.00-.00
Employment (yes/no)	.23	.78	.43	-.35-.80
Poverty Status (level)	.11	1.10	.27	-.09-.32
Highest Degree (type)	-.01	-.20	.84	-.13-.11
Marital Status (M/W/D/S/NM)	-.19	-1.67	.10	-.42-.03
African Americans	-.44	-1.46	.14	-1.05-.15
Hispanic	-.74	-1.42	.16	-1.76-.28
Caucasians (reference category)	----	----	----	-----
Constant	5.17	4.93	.00	3.11-7.24

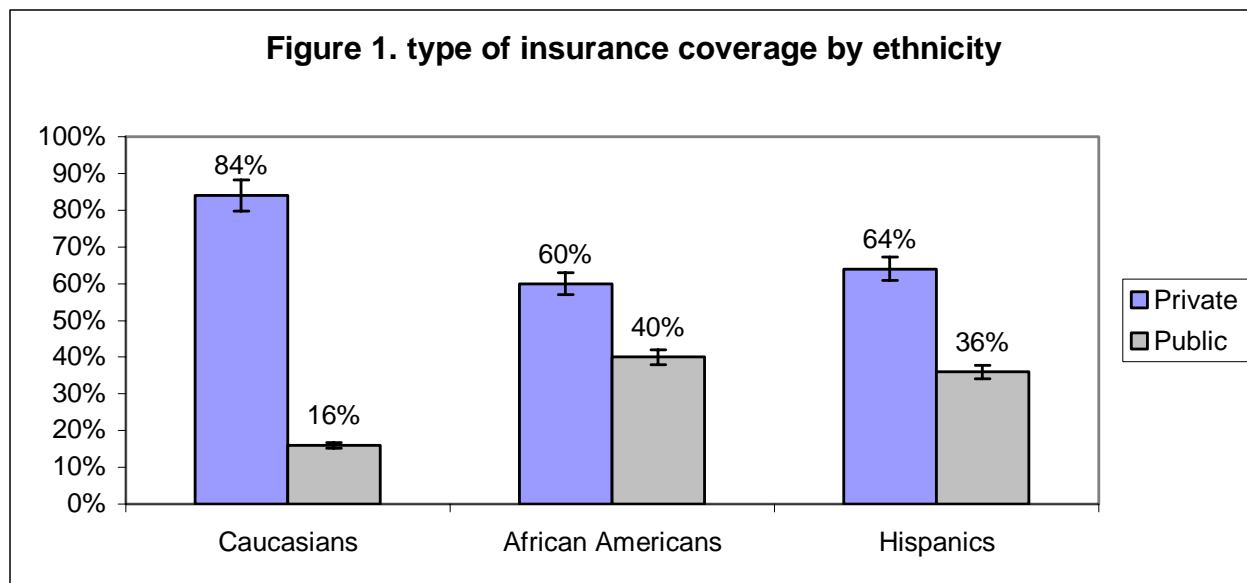
Note. $R^2 = .10$ ($N = 506$, $p < .01$); M=married, W=widowed, D=divorced, S=separated, NM=never married. Also, dependent variable has been log transformed, so coefficients should be interpreted as changes on a log scale.

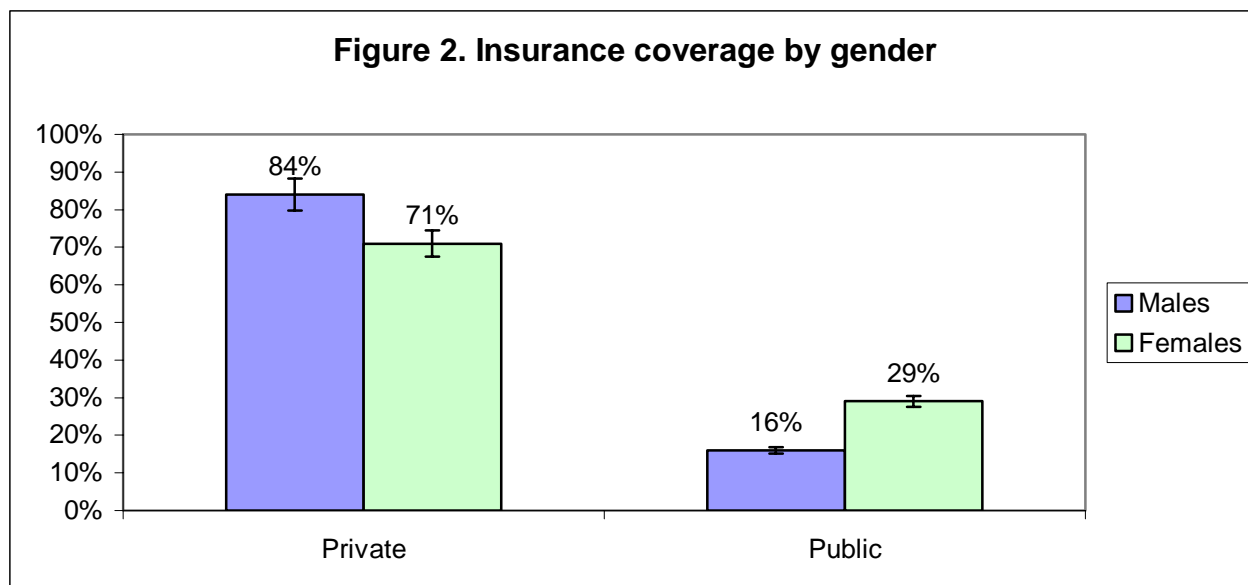
Table 69

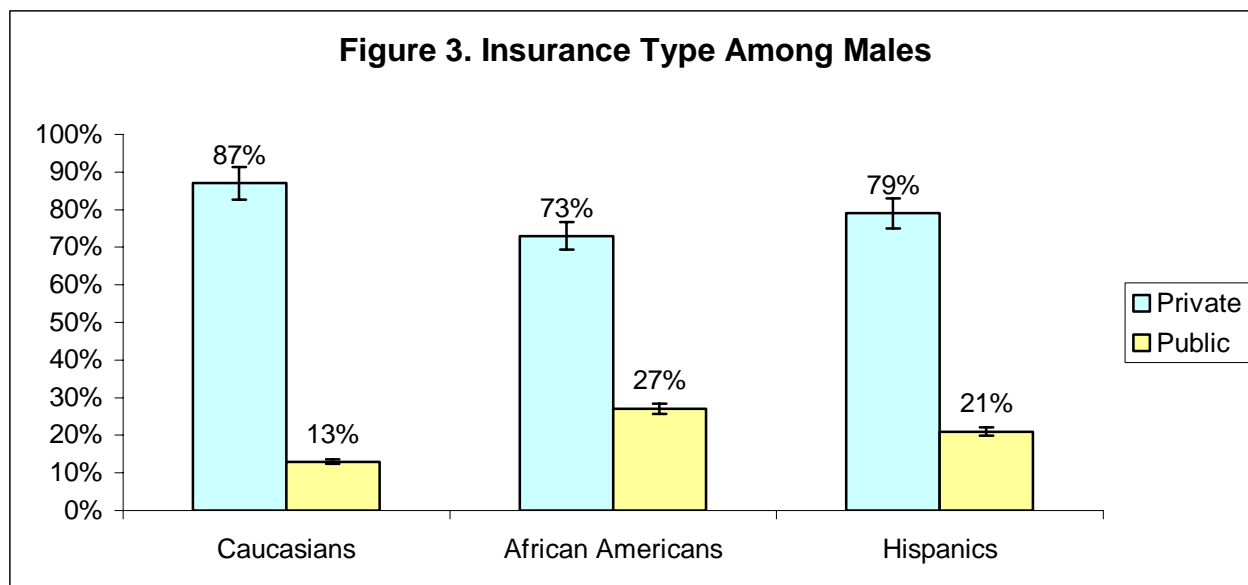
Regression Analysis Summary Relating Dummy Coded Race/ethnicity to Total Out-of-pocket Expenditures after Adjusting for Demographic Variables

Variable (units)	Coeff.	t	p-value	95% CI
Age (in years)	.04	2.47	.01	.01-.07
Family Size (persons)	-.20	-1.76	.08	-.43-.02
Insurance (type)	.12	.31	.76	-.64-.88
Annual Income (in \$)	-.00	-1.14	.26	-.00-.00
Employment (yes/no)	-.03	-.12	.91	-.58-.52
Poverty Status (level)	.05	.48	.63	-.15-.24
Highest Degree (type)	-.04	-.60	.55	-.16-.09
Marital Status (M/W/D/S/NM)	-.15	-1.19	.24	-.39-.10
African Americans	-.34	-1.29	.20	-.87-.18
Hispanic	-.81	-1.56	.12	-1.84-.21
Caucasians (reference category)	----	----	----	-----
Constant	4.13	4.08	.00	2.14-6.12

Note. $R^2 = .08$ ($N = 506$, $p < .01$); M=married, W=widowed, D=divorced, S=separated, NM=never married. Also, dependent variable has been log transformed, so coefficients should be interpreted as changes on a log scale.







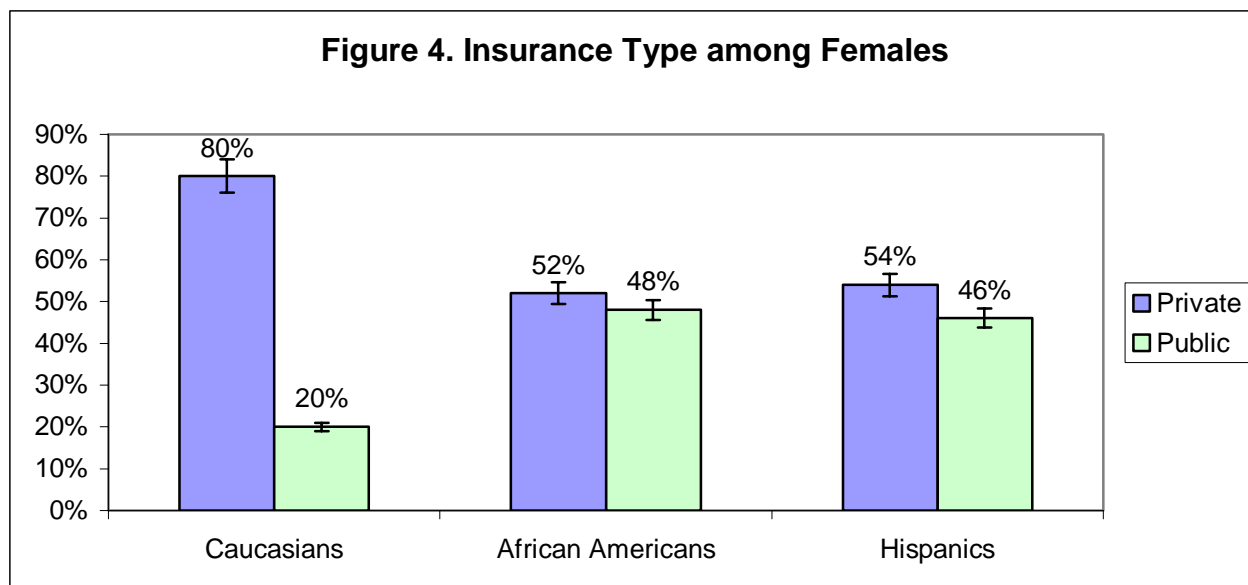


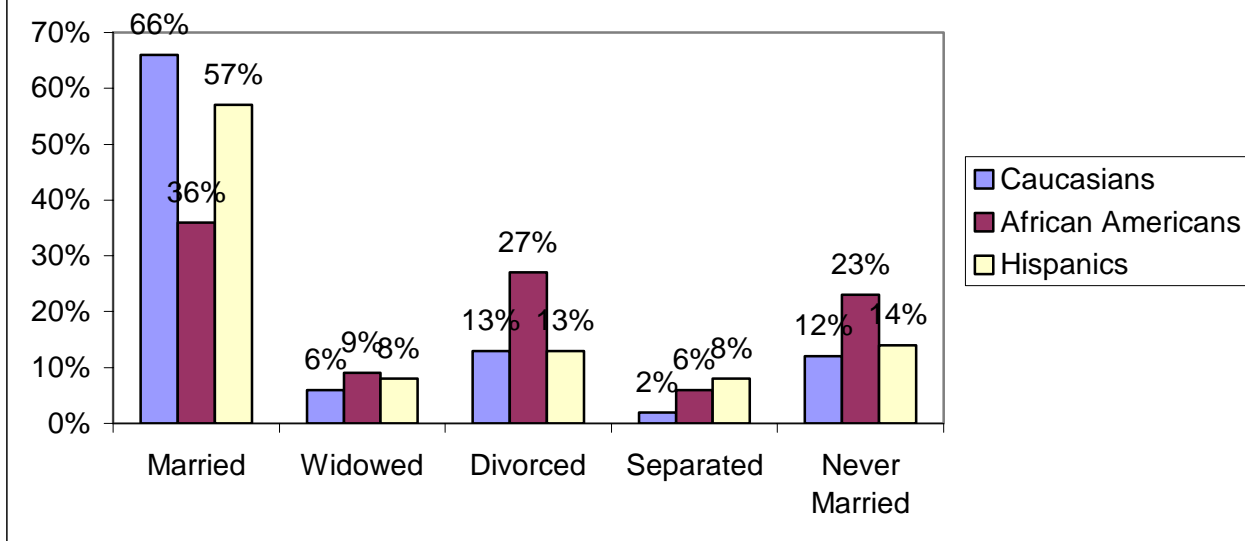
Figure 5. marital status among insured type 2 diabetics

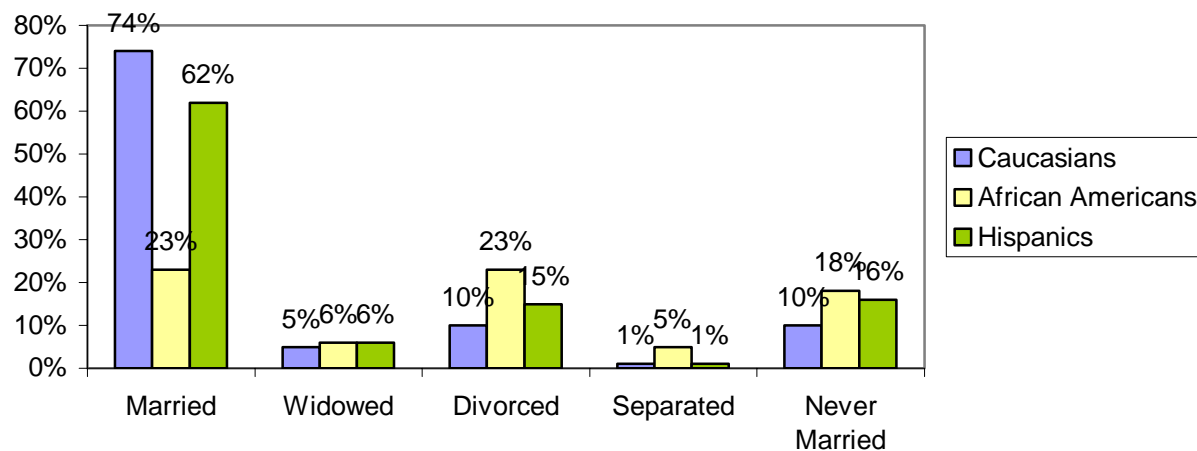
Figure 6. Marital status by race among privately insured

Figure 7. Highest degree acheived among insured type 2 diabetics

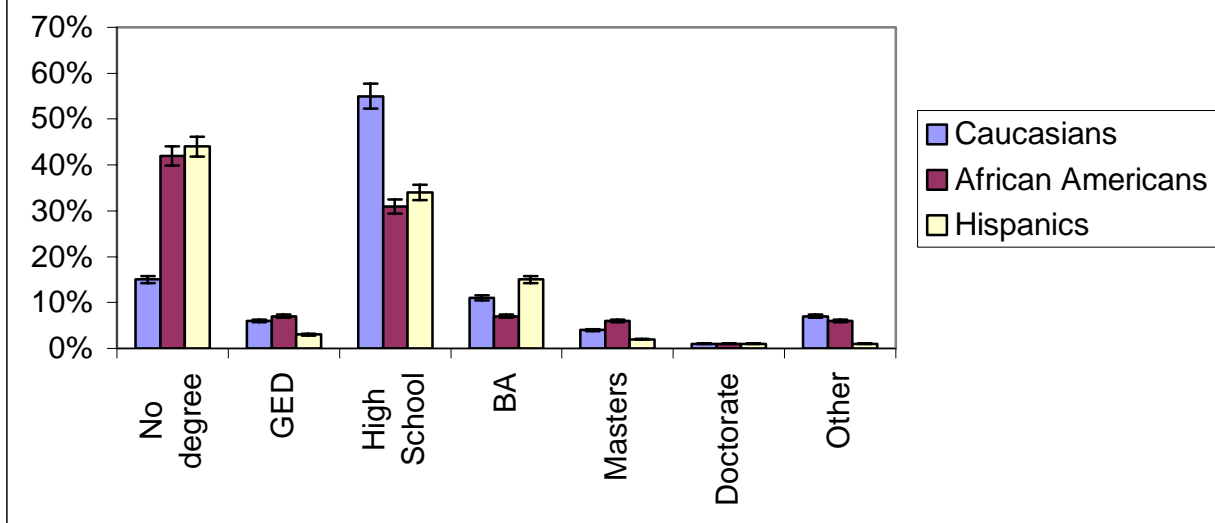


Figure 8. Highest Degree Acheived Privately Insured

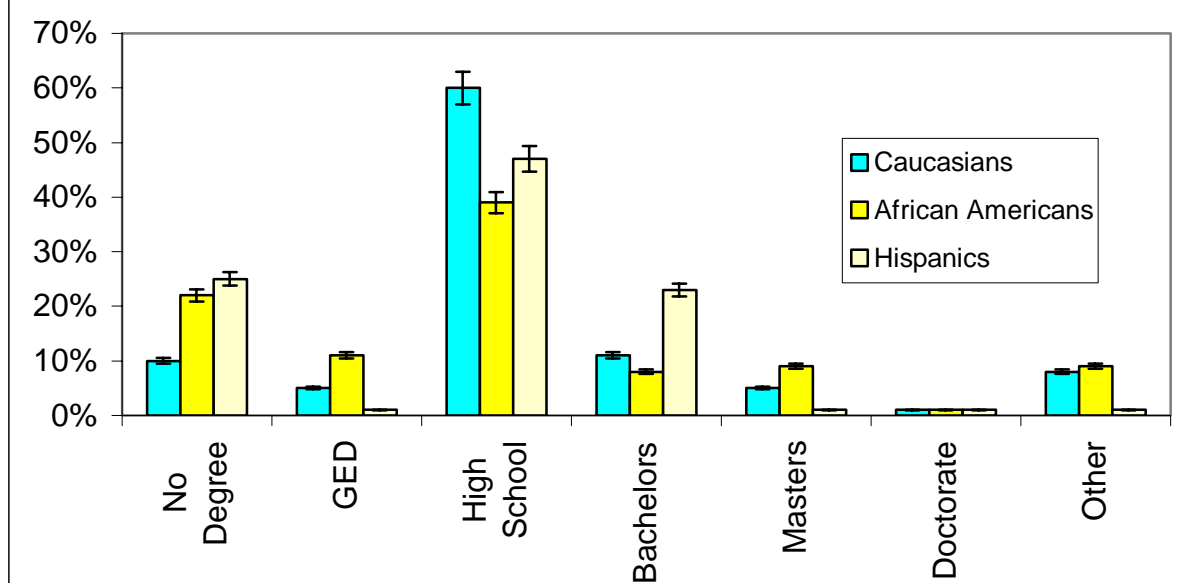
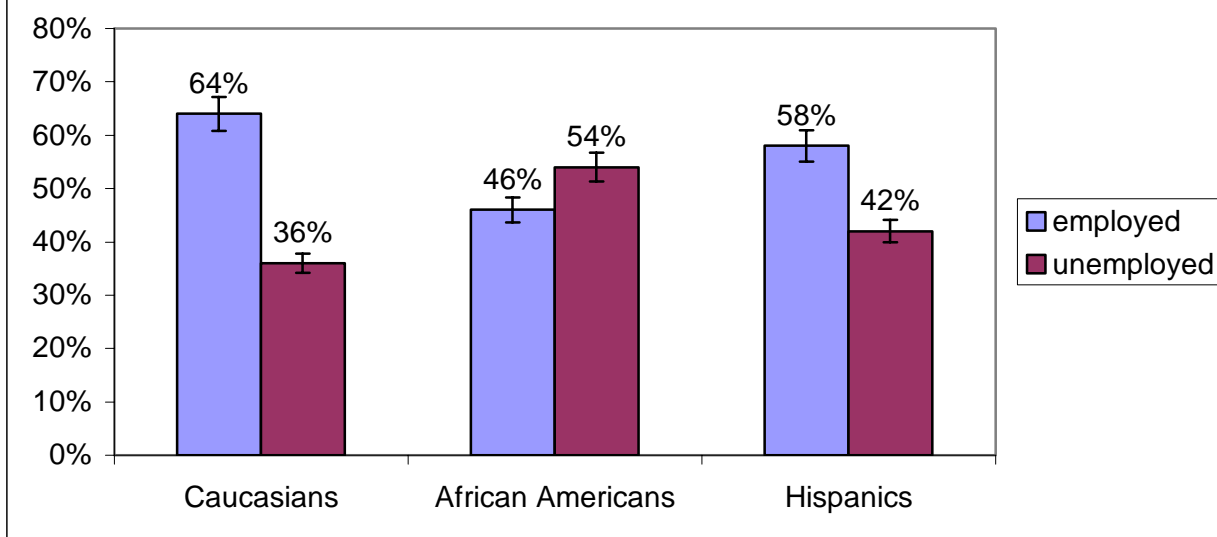


Figure 9. employment status by race

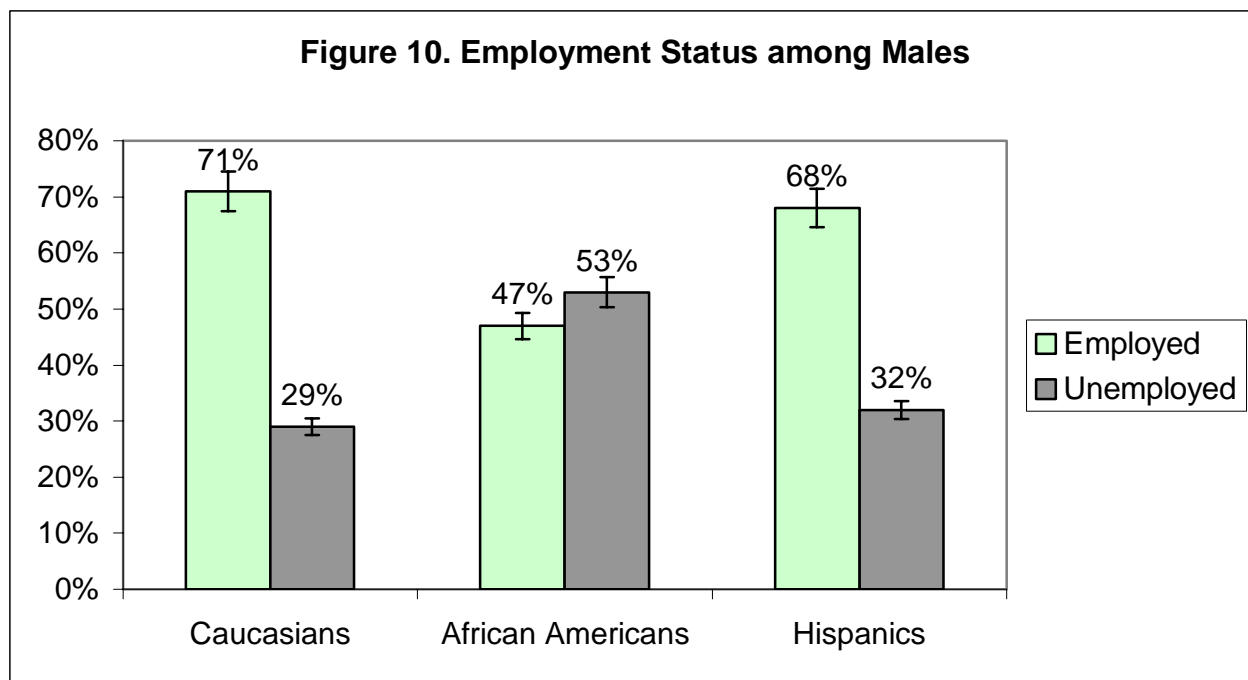


Figure 11. Employment status by race/ethnicity among publicly insured Type 2 diabetics

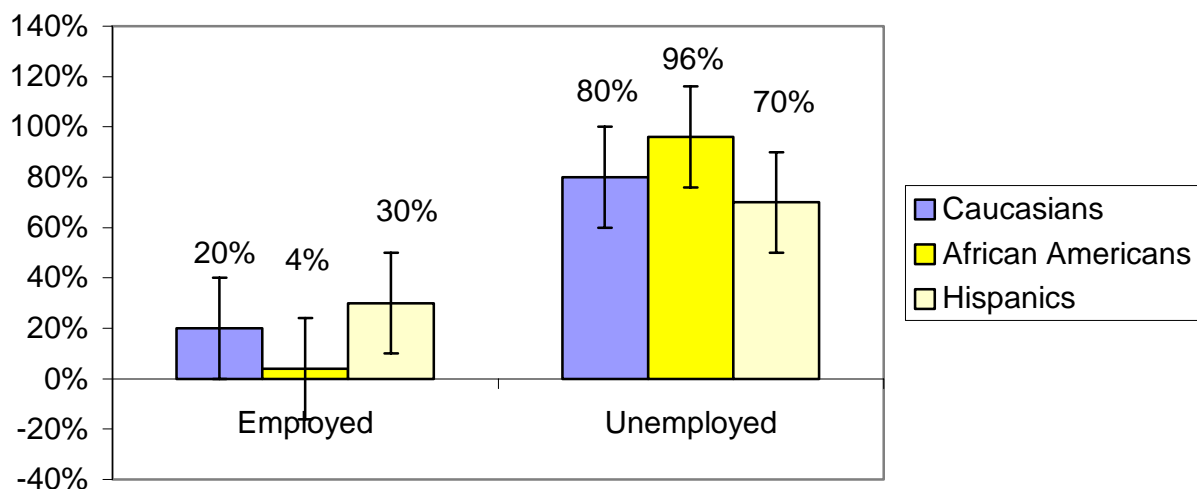


Figure 12. Occupation Type by race

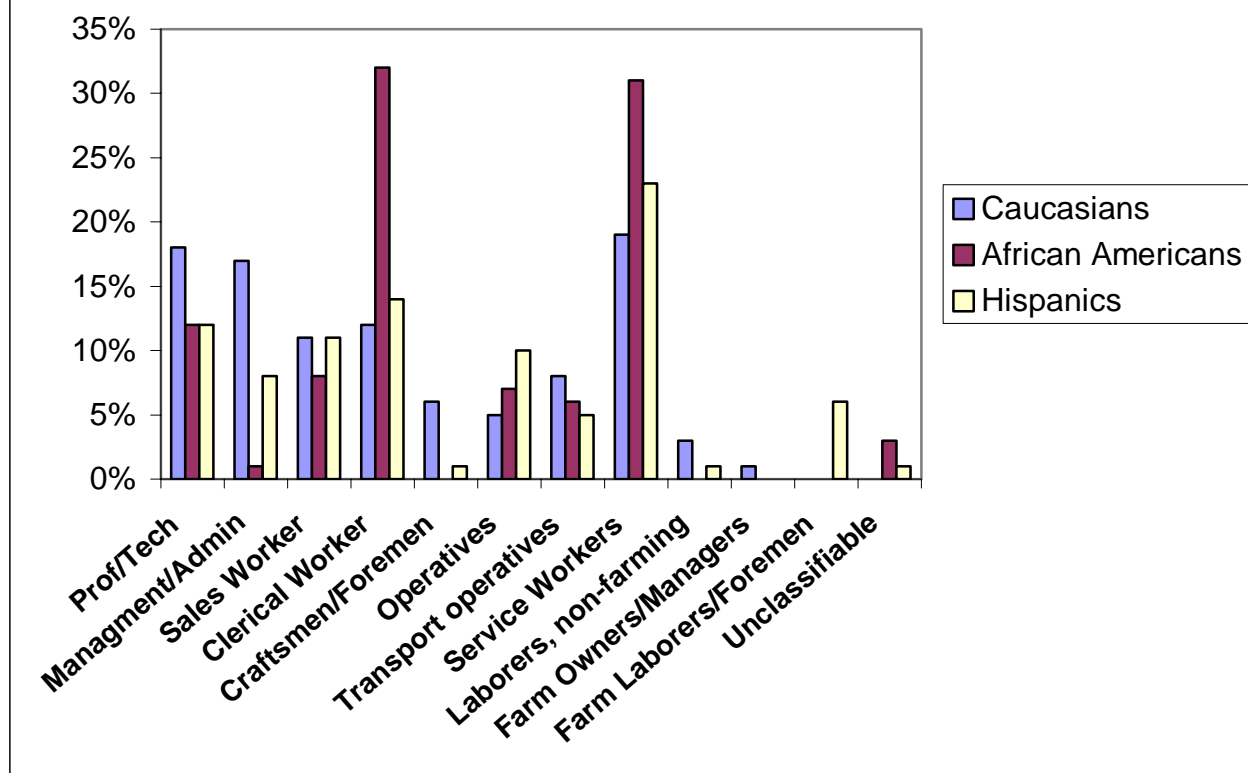


Figure 13. Family income as a percent of poverty line among insured type 2 diabetics

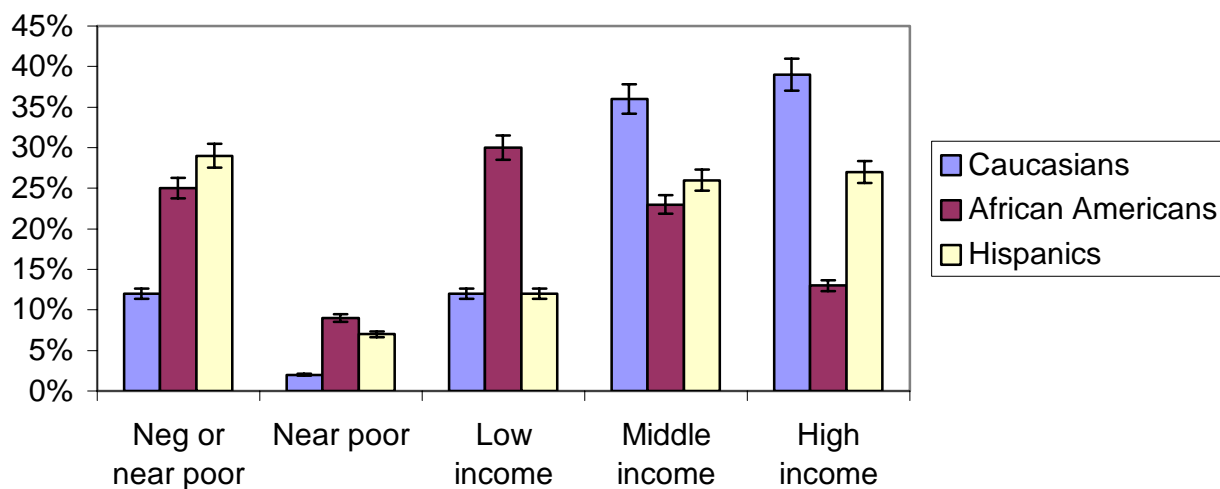


Figure 14. Family income as a percent of poverty line by race among privately insured

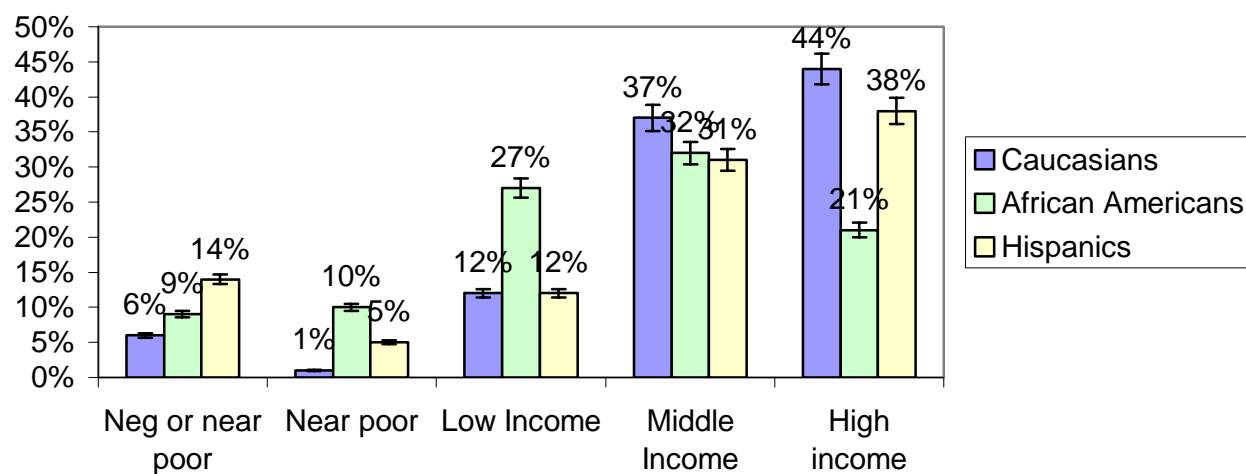


Figure 15. Family income as a percent of poverty line among publicly insured type 2 diabetics

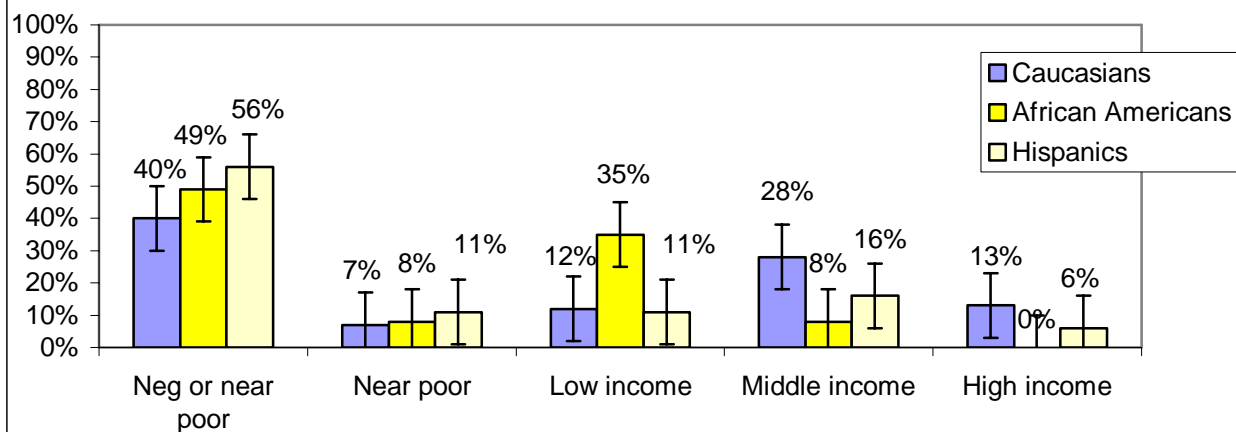


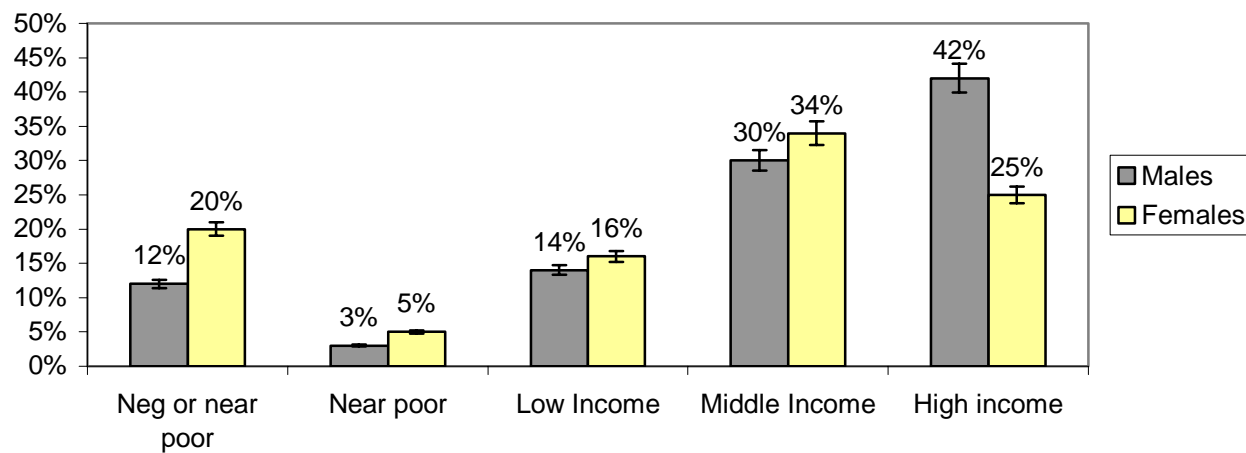
Figure 16. Family Income as a percent of poverty line

Figure 17. Census region among privately insured type 2 diabetics

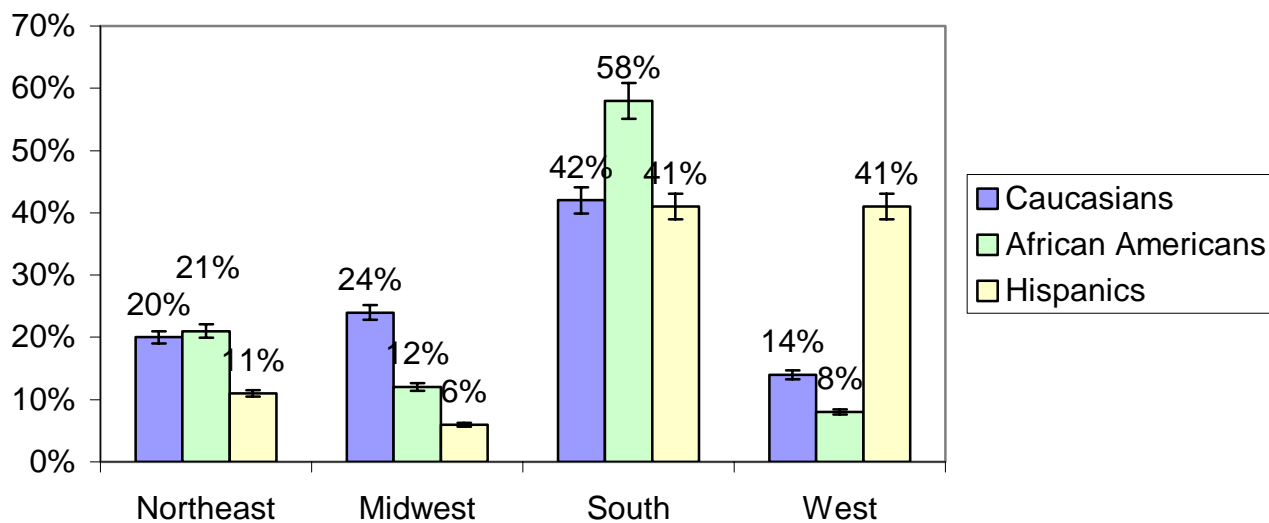


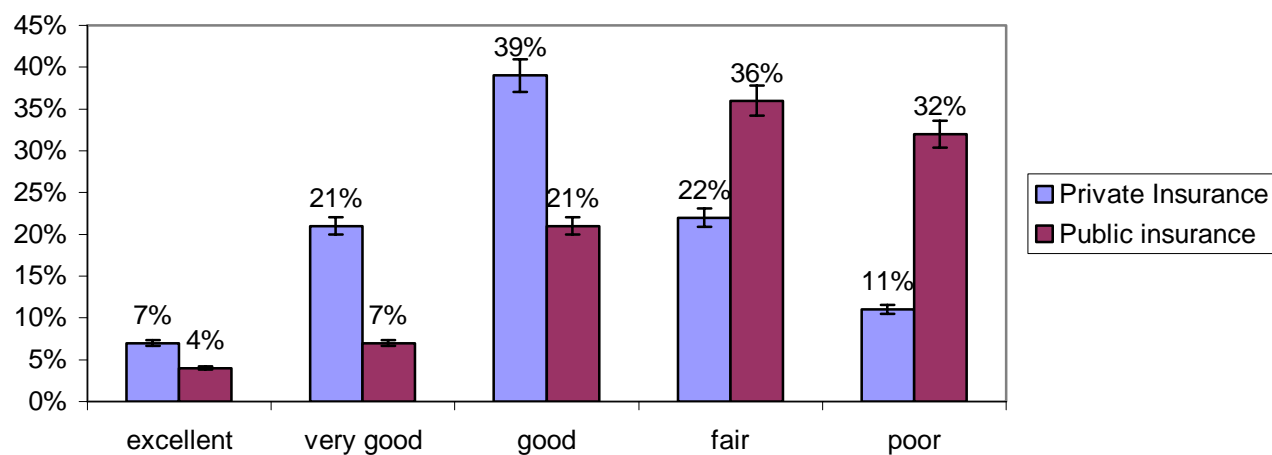
Figure 18. health status by type of insurance coverage

Figure 19. Health Status by age category for insured type 2 diabetics

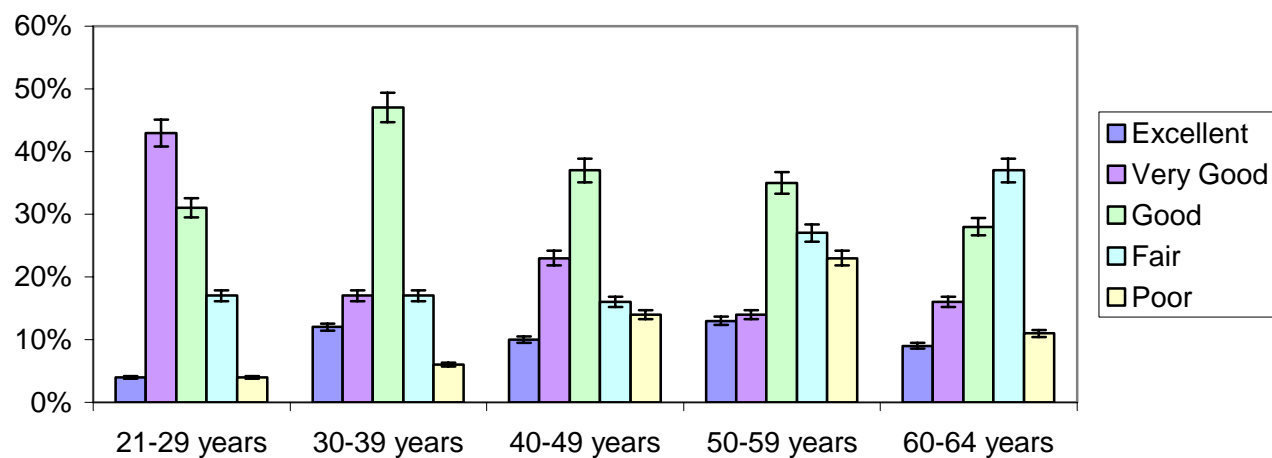
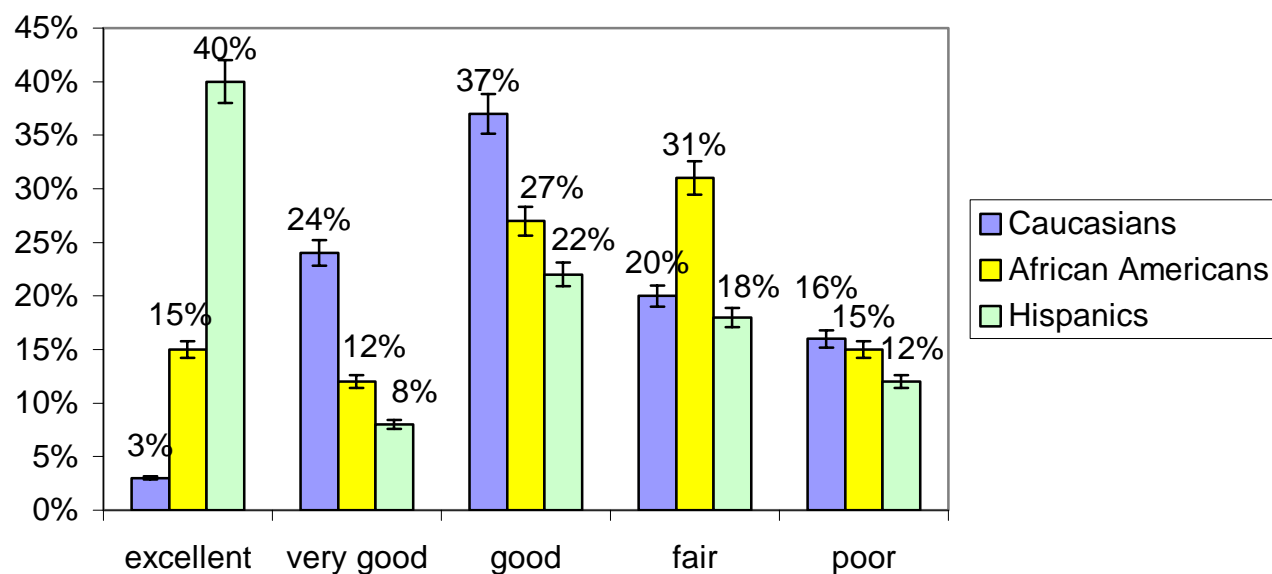


Figure 20. Perceived mental health status by race among publicly insured



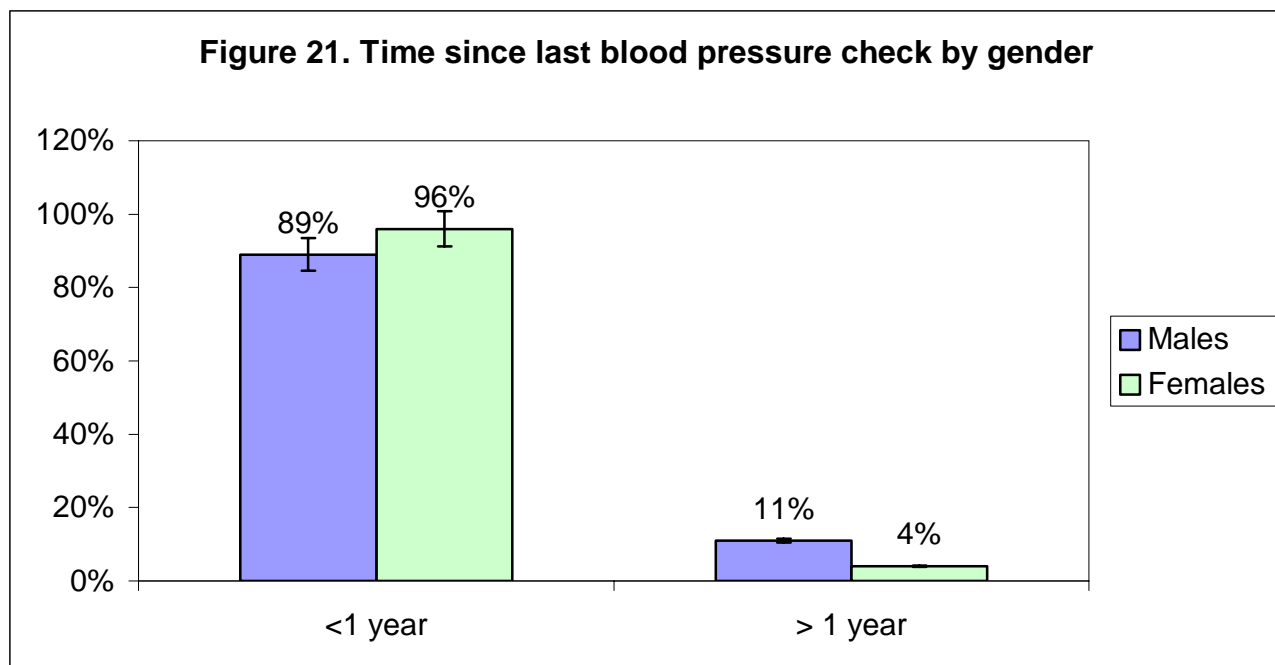
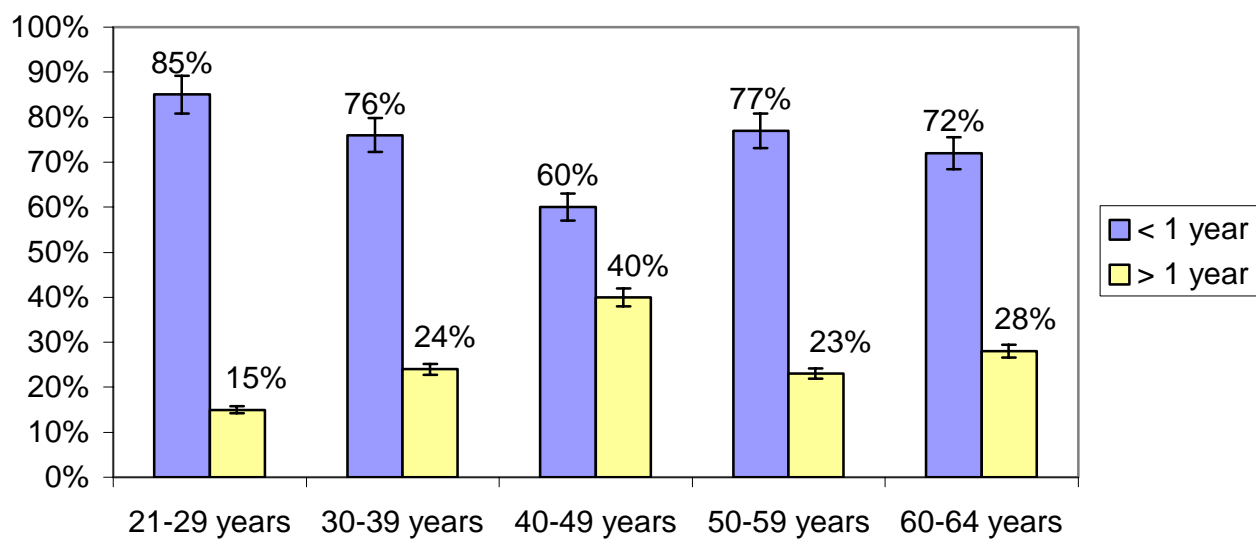


Figure 22. Time since last physical exam by age category

Appendices

Appendix A

Timeline for Using MEPS Dataset

Step 1:	Attend Course 1: Agency for Health Care Research and Quality (AHRQ) overview conference on databases-"Using the Medical Expenditure Panel Survey-MEPS"
Step 2:	Obtain questionnaires for the MEPS
Step 3:	Attend Course 2: AHRQ-"MEPS Data Users' Workshop
Step 4:	Select initial variables from the MEPS questionnaire
Step 5:	Examine measurement scale of initial variable set
Step 6:	Learn new statistical package for analyzing complex survey designs: Complete Course 1 for statistical analysis(on-line): Introduction to STATA 7.0 & Course 2 (on-line): Introduction to Programming
Step 7:	Select final variables for current study
Step 8:	Submit proposal to AHRQ to access data set
Step 9:	Receive permission to use data set from AHRQ
Step 10:	Begin writing program to extract data
Step 11:	Begin data cleaning/organizing variables
Step 12:	Continue to refine data set to examine outcome variables Continue writing/refining program for extracting data
Step 13:	Write program for analyzing data
Step 14:	Preliminary exploratory data analysis completed to determine sample size
Step 15:	Final program for analyzing data written

Appendix B

Three other components of MEPS survey

Medical Provide Component

The Medical Provider Component (MPC) supplements and validates information collected during the Household Component (HC). The MPC collects data from the individual's medical provider including all hospital physicians, home health agencies and pharmacies reported during the HC (Weinick, Zuvekas, & Drilea, 1996). The MPC collects data through telephone interviews and mail surveys.

Insurance Component

The Insurance Component (IC) of the MEPS survey collects data on the health insurance plans obtained through employers, unions, and other private health insurance sources. Data from the IC include information on the number and type of private plans offered, the benefits associated with the plans, premiums, contributions by employers and employees and employer characteristics (Weinick, Zuvekas, & Drilea, 1996). The IC data are collected from the selected organizations through a prescreened telephone interview, a mailed questionnaire and a follow-up telephone interview for non-respondents.

Nursing Home Component

The Nursing Home Component (NHC) collects information every 5 years on persons residing in or admitted to nursing homes during the calendar year. Specifically, the NHC acquires data on demographics, residence history, health, functional status, use of services and prescription medications (Weinick, Zuvekas, & Drilea, 1996). Additionally, information on health care expenses accumulated by the nursing home resident during that year is collected.

Appendix C

Design and Methods of The Medical Expenditure Panel Survey
Household Component

March 1997

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The Medical Expenditure Panel Survey (MEPS), is the third in a series of nationally representative surveys of medical care use and expenditures sponsored by the Agency for Health Care Policy and Research (formerly the National Center for Health Services Research). The first of these surveys, called the National Medical Care Expenditure Survey (NMCES) was conducted in 1977, and the second, called the National Medical Expenditure Survey (NMES), in 1987. The 1996 MEPS, which is co-sponsored by the National Center for Health Statistics (NCHS), will update the 1987 data to reflect the dramatic changes that have occurred in the U.S. health care system over the last decade.

Major changes have taken place in the health care delivery system of the nation since the last NMES survey was conducted almost ten years ago. The most notable is the rapid expansion of managed care arrangements such as HMOs, PPOs, and other provider networks that seek to minimize the increases in health care costs, as well as the appearance of new hybrid forms of health insurance coverage. Changes such as these have affected both the private and public sectors. The new MEPS is needed to provide information about the current state of the health care system in the U.S., and the changes that have taken place since the last national survey of medical expenditures was conducted in 1987. The information collected by the MEPS will also provide valuable baseline data for use in evaluating future changes in the system.

The revised MEPS study design enhances the capabilities to study change over time and the effects of new health policies. These are important objectives in view of the various health reform initiatives that are being implemented by states and the Federal government. The revised design allows for the production of annual estimates for two calendar years, and also permits the tracking of changes in employment, income, health status, and medical care use and expenditures over the two consecutive years during which households in the 1996 panel will be interviewed. In addition, the National Health Interview Survey (NHIS) baseline data are available for persons in the 1996 and 1997 MEPS panels, thereby adding another data point for comparisons of change over time.

The MEPS extends the NMES series of studies on medical expenditures and health insurance, and provides for the first time, data suitable for detailed analysis of trends and changes in these areas. The survey is a unique resource for a number of reasons, including:

1. **Scope.** MEPS provides information on a broad spectrum of the population, as the survey sample base represents the civilian noninstitutionalized population and, in a separate component survey, the population institutionalized in nursing homes. The MEPS also provides information on all types of health care services, expenditures, and sources of payment for both individuals and families.
2. **Population Basis.** The fact that MEPS is a survey of persons allows population groups that are or may become of special policy concern to be identified and analyzed. This is especially important for analyzing the effect of particular eligibility requirements on the enrollment and budgets of public programs and on those who are not eligible for such programs.
3. **Cost-effectiveness.** MEPS will collect data needed by groups that might otherwise sponsor separate or overlapping surveys, or do without crucial information needed for important decisions. Experience has demonstrated that broad-based data on use, expenses, and financing of health care collected from a nationally representative sample can meet the data needs of a wide variety of users in a cost-effective manner.

The original sample design of the NMES household surveys has been revised for the MEPS. Instead of defining the MEPS sample through an initial screening round, the sample in the new design is selected as a nationally representative subsample from households that participated in the NHIS. The 1996 MEPS sample (based on the 1995 NHIS) will be carried forward into 1997 and combined with a new subsample of households responding to the 1996 NHIS. These two panel samples (the 1996 MEPS sample and the new MEPS selections from the 1996 NHIS) will jointly define the sample base for the 1997 MEPS Household Component. Exhibit 1 is a diagram of the study design for the 1996 and 1997 MEPS Household Components. Exhibit 2 summarizes various features of the study design for the Household Component.

In 1996, the MEPS sample linked to the 1995 NHIS was selected from a nationally representative NHIS subsample that included 195 PSU's and approximately 1,700 segments, yielding approximately 10,500 responding NHIS households that MEPS recontacted. This NHIS subsample reflects an oversample of Hispanics and blacks. Other groups with high public policy relevance in the areas of health care use and financing are targeted for oversample as part of the MEPS 1997 panel to improve the precision of the estimates for those groups.

Households selected for participation in the 1996 or the 1997 MEPS household surveys are interviewed in person five times (Rounds 1-5), and a last time during a brief telephone interview (Round 6). The rounds of data collection are spaced approximately 4 months apart. The interviews take place with a family respondent who reports for him/herself and for other family members.

Preliminary Contact. Mail and telephone contacts take place prior to the first MEPS interview (Round 1) with the NHIS participating households selected for each MEPS panel. The purpose of the Preliminary Contact is to enlist the household respondent into the MEPS study and plan for the delivery of study record-keeping materials prior to the start of the study observation period on January 1st of the survey year. An advance letter announcing the MEPS survey is mailed in December to the family respondent at the address where the NHIS interview was conducted. That letter is followed up with an interviewer telephone call to confirm the arrival of the letter, verify the identity of the household, identify the MEPS family respondent (if different from the NHIS respondent), and announce the future mailing of a study calendar and record file. These materials are sent accompanied by \$5 to compensate respondents for the time and effort devoted to keeping records in preparation for the Round 1 interview. A second telephone call confirms the arrival of these materials and arranges for the most convenient time to conduct the Round 1 interview.

Households without telephones or those that can not be reached using the telephone number from NHIS, are contacted by mail and asked to return a postcard identifying a telephone number where the study can contact them (e.g., number at work, neighbor's house, etc.).

Core rounds. Data collection for the MEPS Household Component takes place using the Computer-assisted Personal Interview (CAPI) system. The study instrumentation is organized as a core instrument that is administered in each of the first 5 rounds of data collection, with periodic supplements added in selected rounds to deal with specific topics in greater depth. Dependent interviewing methods, in which respondents are asked to confirm or revise data provided in earlier interviews will be used to update information in several of the core questionnaires, such as employment and health insurance, after the initial interview.

- **Core Instrument:** The core instrument will collect data about all persons in sampled households. The core instrument includes questionnaires on: demographics, health status and conditions, utilization, charges and payments,

prescribed and over-the-counter medicines purchased, employment, and health insurance.

- Periodic Supplements: Supplements scheduled for inclusion in the survey include questionnaires on: access to care and satisfaction, income and assets, long-term care, and alternative care.
- Self-Administered Questionnaire (SAQ): All adults in sample households are asked to complete an SAQ in Round 2. This questionnaire collects information about health behaviors and opinions that would be difficult if not impossible to collect on a proxy basis from the family respondent. Similar information is collected for children as part of the regular interview with the household survey respondent, usually the mother.
- Medical Provider Permission Forms: Requests for signed permission forms take place in Round 1 of the survey, much earlier than in past NMES studies, in order to expedite the timetable for the later Medical Provider Component (MPC) of the survey, which collects data about specific medical events directly from providers. Because results from a previous methodological study suggested that early requests for signed permission forms involving office-based physicians have a modest negative effect on survey cooperation rates in later rounds, the requests for signed permission forms in Round 1 will be limited to events taking place in hospitals. In Round 2 and subsequent rounds, requests for signed permission forms will apply to all types of MPS-eligible medical providers (hospitals, physicians, and home health agencies), including those associated with utilization reported in Round 1.
- Health Insurance Permission Forms: Signed permission forms are needed to contact sources of employment and private health insurance coverage in the Insurance Component of the survey, which collects data directly from individuals' sources of health insurance (typically their employers). These requests will be initiated in Round 2, and apply to the insurance sources associated with plans held at the time of the Round 1 interview.
- Health Insurance Policy Booklet Requests: Following procedures tested successfully in a previous methodological study, MEPS interviewers will attempt to secure, directly from respondents, health insurance booklets or other summary materials that describe the characteristics of private plans held by family members at the time of the Round 1 interview. The requests for policy information will include all sources of private insurance coverage, not just employment-related coverage. Respondents are reimbursed \$15 for the time and effort involved in procuring policy booklets.
- Provider Directories: To expedite the identification of medical providers and assist with the preparation of an unduplicated list of medical providers for the fielding of MPS, interviewers use a computerized database (directory) of health providers that has been loaded into the CAPI laptop. Search software also loaded into the laptops enables interviewers to query the database of providers in the course of the MEPS interview. If a match is found in the database for the provider nominated by the household respondent, the matched directory record is associated with the household member. Directory records include the following information for each provider: a unique provider ID; the

provider's name, address and telephone number; and the provider's specialty (for individual office-based physicians).

At the most basic level, the objective of the MEPS Household Component is the collection of data that can be used to produce annual estimates for a variety of measures related to the characteristics of individuals, their health insurance coverage, and their health care use, expenditures, and sources of payment for care. The data can also be used to support behavioral analyses that inform researchers and policymakers about how the characteristics of individuals and families, including their health insurance, affect medical care use and spending.

Data obtained in this study will be used to produce, for example, the following national estimates for calendar years 1996 and 1997:

- annual estimates of health care use and expenditures for persons and families.
- annual estimates of sources of payment for health care expenses, including amounts paid by public programs, such as Medicare and Medicaid, and by private insurance, as well as out-of-pocket payments.
- annual estimates of health care use, expenditures and sources of payment for persons and families by type of service, including: inpatient hospital stays, ambulatory care, home health care, dental care, and purchases of prescribed and over-the-counter medicines.
- the number and characteristics of the population eligible for each of the public programs, including the use of services and expenditures of the population eligible for benefits under Medicare, Medicaid, CHAMPUS/VA and the Veterans Administration.
- the number, characteristics, use of services, expenditures and benefits of persons and families with individual or group coverage, commercial and nonprofit coverage, and coverage through HMOs or other managed care arrangements.

In addition to national estimates, data collected in this longitudinal study will be used to study the determinants of the use of services and expenditures, and the effects of individual characteristics and policy changes on medical care use and expenses. These behavioral analyses will include studies of:

- social and demographic factors such as employment and income.
- methods of financing health care and health insurance.
- the health habits, life styles and behavioral patterns of individuals and families.
- the health needs of specific subpopulation groups of current or potential policy interest, such as the elderly and members of racial or ethnic minorities.

Finally, data collected in this survey in conjunction with data from the 1977 NMCES and the 1987 NMES will be used to study trends in the nature and distribution of national health expenditures, sources of care, and amounts and types of services consumed by the U.S. noninstitutionalized population.

Exhibit 1. Panel Design for the MEPS Household Component, 1996 and 1997

	Calendar Year 1996		Calendar Year 1997		Calendar Year 1998	
	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6
1996 Panel (from 1995 NHIS)						
Field period	3/96-7/96	8/96-11/96	2/97-5/97	8/97-11/97	2/98-5/98	6/98-7/98
Responding households	9,500	9,000	8,800	8,500	8,300	8,100
1997 Panel (from 1996 NHIS)			Round 1	Round 2	Round 3	Round 4
Field period			3/97-7/97	8/97-11/97	2/98-5/98	8/98-11/98
Responding households			5,800	5,500	5,400	5,200
Total Responding Households	9,500	9,000	14,600	14,000	13,700	13,300

Exhibit 2. Design Features of the MEPS Household Component, 1996 Panel

Feature	1995	1996	1997	1998	
Data collection	Preliminary contact	Round 1	Round 3	Round 5	Round 6
Reference period	-	1/1/96 to date of Round 1 interview	Date of Round 2 interview to date of Round 3 interview	Date of Round 4 interview to date of Round 5 interview	-
Field period	12/95-1/96	3/96-7/96	2/97-5/97	2/98-5/98	6/98-7/98
Interview mode	Mail/Telephone	In-person/CAPI	In-person/CAPI	In-person/CAPI	Telephone

Appendix D

Sample Design of the 1996 Medical Expenditure Panel Survey
Household Component

March 1997

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1.0 Introduction

The Household Component of the 1996 Medical Expenditure Panel Survey (MEPS) was designed to produce national and regional estimates of the health care utilization, expenditures, sources of payment, and insurance coverage of the U.S. civilian noninstitutionalized population. The MEPS includes surveys of medical providers, employers, and other health insurance providers to supplement the data provided by household respondents. The design of the MEPS permits both person-based and family-level estimates. The scope and depth of this data collection effort reflects the needs of government agencies, legislative bodies, and health professionals for the comprehensive national estimates needed in the formulation and analysis of national health policies.

The MEPS collects data on the specific health services that Americans use, how frequently they use them, the cost of these services and how they are paid, as well as data on the cost, scope, and breadth of private health insurance held by and available to the U.S. population. The MEPS is unparalleled for the degree of detail in its data, as well as its ability to link health service medical expenditures and health insurance data to the demographic, employment, economic, health status, utilization of health services, and other characteristics of survey respondents. Moreover, the MEPS is the only national survey that provides a foundation for estimating the impact of changes in sources of payment and insurance coverage on different economic groups or special populations of interest, such as the poor, elderly families, veterans, the uninsured, and racial and ethnic minorities.

In this paper, the sample design of the MEPS, initially referred to as the National Medical Expenditure Survey (NMES-3), is described. The 1996 MEPS used the 1995 National Health Interview Survey (NHIS) as the sample frame for the survey. The redesigned MEPS reflects the first stage of implementation of the Department of Health and Human Services (DHHS) Survey Integration Plan, which provides directives targeted to improve the analytic capacity of programs, fill major data gaps, and establish a framework in which DHHS data activities are streamlined and rationalized. Through this effort, specifically through a linkage to the NHIS, the MEPS has achieved a number of significant design improvements and analytic enhancements.

Attention is given to the resultant design efficiencies and enhancements in analytical capacity that have been and will be realized through the MEPS sample design integration with the NHIS. The report includes a summary of sample size specifications and precision targets for national population estimates and health care expenditure estimates for policy-relevant population subgroups. A discussion is also provided regarding the modification of the MEPS from a periodic annual survey to an ongoing continuous data collection effort with each expenditure panel of households followed for two years.

2.0 Redesign of the Medical Expenditure Survey as a Component of the DHHS Survey Integration Plan

As part of the Reinventing Government Part II (REGO II) activities, the DHHS targeted the improvement of the analytical capacity of DHHS programs, the filling of major data gaps, and the establishment of a survey consolidation framework in which DHHS data activities are streamlined and rationalized. A Survey Consolidation Working Group was charged with developing a consensus plan for meeting these objectives (Hunter, Arnett, Mathiowetz, et al., 1995; Arnett, Hunter, and Cohen, et al., 1996). A major concentration of the Survey Integration Plan was the redesign of the health care

expenditure and insurance studies conducted by the DHHS which include the National Medical Expenditure Survey (NMES), the Medicare Current Beneficiary Survey (MCBS), the National Employer Health Insurance Survey (NEHIS), and the NHIS. The proposed integrated survey design was specified to achieve significant cost efficiencies by eliminating duplicative efforts and reducing overall respondent burden. Furthermore, by virtue of integrating the design features of the component surveys, their respective analytical capacities are enhanced. A number of survey design enhancements were also proposed to improve upon current survey design capabilities. These included considering an ongoing longitudinal survey effort and allowing for a future capacity to derive state-specific health care estimates. Consideration was also given to the inclusion of a periodic institutional component in the survey to provide national use and expenditure estimates for the population residing in nursing homes (Hunter, Arnett, Mathiowetz, et al., 1995).

2.1 Design Enhancements and Efficiencies to be Achieved Through Survey Integration

One of the attractions of the DHHS Survey Integration Plan was the enhanced analytical capacity that would be achieved by the distinct surveys that would be linked through design integration. This could be realized by sample size expansions that would occur through survey mergers such as the planned integration between the MEPS and the MCBS and the consolidation of employer surveys conducted by the DHHS. Also, use of the NHIS as a sample frame for the MEPS would increase the analytical content of the resultant linked surveys. Through design integration of the respective surveys sponsored by the DHHS, inefficiencies associated with duplicative survey efforts would be significantly reduced. Another goal was to achieve reductions in survey design costs by the implementation of a uniform framework for DHHS-sponsored surveys with overlapping analytical focus with respect to questionnaire content, data editing, imputation, estimation, database structure, and development of analytic files. Additional efficiencies in survey operations are anticipated in future years as a consequence of conducting an annual medical expenditure survey rather than one every decade.

By moving to this integrated, annual household data collection effort, the DHHS expands and enhances its analytic capabilities as described below:

- Retains the design of the core NHIS household interview. This core will provide cross-sectional population statistics on health status and health care utilization with sufficient sample size to allow for analyses based on detailed breakdowns of age, race, sex, income, and other sociodemographic characteristics. The core will also allow the use of data on a broad range of topics currently provided by the NHIS.
- Retains the analytical capacity to obtain both annual and quarterly population estimates of health care utilization and the prevalence of health conditions, for the nation and for policy-relevant population subgroups.
- Provides the ability to model individual (and family-level) health status, access to care and use, expenditure, and insurance behavior over the year and examine the distribution of these measures across individuals. The longitudinal feature of the MEPS to collect data over multiple years further enhances the capacity to model behavior over time.

- Provides the ability to relate data from a detailed sample (e.g., MEPS) to a larger sample (e.g., NHIS) to enhance the utility of the MEPS for national health account estimation and microsimulation modeling, including disaggregation by age group or geographic area.
- Provides the potential to expand to state-level estimates for marginal costs using the enhanced 358 PSU sample design of the NHIS.
- The longitudinal (over several years) aspect of the MEPS integrated data collection effort provides the following:
 - An increase in statistical power to examine change or make comparisons over time;
 - The capacity to examine changes over time as well as changes in the relationship among measures of health status, access to care, health care use, expenditures, health insurance coverage, employment, functional limitations and disabilities, and demographic characteristics.

2.2 MEPS Household Component

The original NMES-3 sample design called for an independent screening interview to identify a nationally representative sample and facilitate oversampling of policy-relevant population subgroups. Data collection and training costs associated with this independent screening interview were projected to exceed \$8 million. As part of the DHHS Survey Integration Plan, the separate screening interview to identify the expenditure survey sample was eliminated. As an alternative, the NHIS was specified as the sampling frame for the medical expenditure survey, MEPS. The NHIS is an ongoing annual household survey of approximately 42,000 households (109,000 individuals) conducted by the National Center for Health Statistics (NCHS) to obtain national estimates for the U.S. civilian noninstitutionalized population on health care utilization, health conditions, health status, insurance coverage, and access. In addition to the cost savings achieved by the substitution of the NHIS as the MEPS sample frame, the design modification will result in an enhancement in analytical capacity of the resultant survey data. Use of the 1995 NHIS data in concert with the data collected for the 1996 MEPS provides an additional capacity for longitudinal analyses not available in the original (NMES-3) design. Furthermore, the greater number and dispersion of the sample PSUs that comprise the MEPS national sample should result in improvements in precision over the original design specifications.

To fill major data gaps identified by the DHHS, the MEPS is specified as a continuous survey with sample peaks at five year intervals. The initial sample of 10,597 NHIS dwelling units selected for the 1996 MEPS is reduced from the original 1996 plan to also permit estimates for calendar year 1997. An overlapping panel design will be adopted for the MEPS, where the 1996 panel will be followed for data collection through 1997. A new nationally representative sample of 6,300 dwelling units will be selected from the 1996 NHIS to supplement the 1996 MEPS panel in order to meet the original precision specifications for the specified policy-relevant population subgroups for calendar year 1997, with the exception of the elderly. These policy-relevant population subgroups consist of:

- Adults (18+) with functional impairments.

- Children with limitations of activity.
- Individuals predicted to incur high medical expenditures.
- Individuals predicted to have incomes less than 200% of the poverty level. (Cohen, 1996).

A preliminary contact with the NHIS responding households selected for the MEPS study was made prior to the start of the MEPS, to announce the survey and introduce record-keeping activities. The revised study design of the MEPS includes several components: the Household Component (HC) consisting of an overlapping panel design in which any given sample panel is interviewed a total of six times over three consecutive years to yield annual data for two calendar years; the Medical Provider Component (MPC) with a sample of medical providers that treated HC persons; and the Insurance Component (IC) with a sample of employers and other sources of health insurance of HC persons. The survey is co-sponsored by the Agency for Health Care Policy and Research (AHCPR) and the NCHS. Westat and the National Opinion Research Center (NORC) are the data collection organizations for the 1996 MEPS Household Component.

2.3 MEPS Household Component Sample Design

The 1996 MEPS Household Component sample was selected from households that responded to the 1995 NHIS. The NHIS has been designed to permit nationally representative subsamples to be selected by restricting the sample to one of four distinct panels. Any combination of one to four panels will provide a nationally representative sample of households. Furthermore, each NHIS panel subsample for a given quarter of a calendar year is nationally representative. The 1996 MEPS household sample linked to the 1995 NHIS was selected from two of the four 1995 NHIS panels and encompassed half of the households in the NHIS sample during the second and third quarters of 1995.

The complete 1995 NHIS sample (panels 1-4) consists of 358 Primary Sampling Units (PSUs, e.g., counties or groups of contiguous counties) with a targeted sample of approximately 42,000 responding households. The sample PSUs selected for the NHIS were stratified by geographic (Census region and state), metropolitan status, and sociodemographic measures (Judkins, Marker, and Waksberg, 1994). Within sample PSUs, a sample of blocks (segments) were selected after being stratified by measures of minority population density which allowed for an oversample of areas with high population concentrations of blacks and Hispanics. A nationally representative sample of approximately 71,000 addresses within sampled blocks was selected and targeted for further screening to facilitate an oversample of blacks and Hispanics as part of the 1995 NHIS interview.

The 1995 NHIS subsample selected for the 1996 MEPS consists of 195 PSUs. In the two targeted quarters of 1995 these PSUs include approximately 1,675 sample segments (second stage sampling units) and 10,597 responding NHIS households. This NHIS sample reflects an oversample of households with Hispanics and blacks at the following approximate ratios of representation relative to the remaining households (Hispanics 2.0:1, blacks 1.5:1). This 1996 MEPS sample will constitute a panel that will be surveyed to collect annual data for two consecutive years.

A new 1997 MEPS panel sample will be selected as a nationally representative subsample from households that respond to the 1996 NHIS. More specifically, the 1997 MEPS sample linked to the 1996

NHIS will be selected from two of the four NHIS panels and will reflect additional disproportionate sampling in order to satisfy the precision requirements specified for the 1997 MEPS household survey, which generally coincide with the original plan for the 1996 survey (Cohen, 1996). As in 1995, the complete 1996 NHIS sample will consist of 358 PSUs with a targeted sample of approximately 42,000 responding households. The nationally representative 1996 NHIS subsample reserved for the 1997 MEPS prior to additional subsampling will be obtained from the same 195 PSUs selected for the 1996 MEPS household sample and include approximately 21,000 responding NHIS households as eligible for sample selection. Once again, this NHIS sample reflects an oversample of Hispanics and blacks at the following approximate ratios of representation relative to the remaining households (Hispanics 2.0:1, Blacks 1.5:1). A nationally representative subsample of approximately 6,300 NHIS responding households (6,480 reporting units) will be selected for the new 1997 MEPS panel. This sample will consist of an oversample of the following policy-relevant subgroups:

- Adults (18+) with functional impairments.
- Children with limitations of activity.
- Individuals predicted to incur high medical expenditures.
- Individuals predicted to have incomes less than 200% of the poverty level.

An oversample of non-functionally impaired elderly individuals was not planned for the 1997 survey, given the availability of the 1997 MCBS and the planned future consolidation of the MCBS and the MEPS. The MCBS is an annual person-based survey to obtain the same types of estimates derivable from the MEPS household survey on the health care utilization, expenditures, sources of payment, and health insurance coverage for Medicare beneficiaries. The new 1997 MEPS panel will be fielded to collect annual data for two consecutive years.

As part of the redesign, the 1997 MEPS Household Component sample will consist of the new nationally representative 1997 MEPS panel in combination with the second year of the 1996 MEPS sample. Overall, the 1997 MEPS household sample will consist of approximately 13,700 reporting units (total adjusted for MEPS Round 1 "split-offs," though not reflecting new split-offs in Rounds 2 and 3) completing the full series of MEPS interviews to obtain calendar year use and expenditure data for calendar year 1997. Sample selection procedures for the 1997 MEPS sample will be implemented in-house by AHCPR staff, based on data keyed from the 1996 NHIS interviews.

In 1998, a new MEPS sample of approximately 5,200 households (5,350 reporting units) will be selected as a nationally representative subsample of households that responded to the 1997 NHIS. In addition, the entire 1997 panel of 5,397 reporting units will be continued to obtain calendar year 1998 data on health care use and expenditures (with a targeted round-specific response rate of 97 percent). Consequently, the MEPS sample for 1998 will consist of approximately 9,500 reporting units (adjusted for split-offs in Round 1) completing three core rounds of data collection to obtain calendar year data (4,457 households from the new sample, 5,078 from the 1997 MEPS sample). In 1998, the 1996 MEPS panel will be retired.

For years 1998-2001, the survey will scale back to an overall sample of approximately 9,500 reporting units completing three core rounds of data collection to obtain calendar year data on health care utilization and expenditures, with approximately 5,000 continuing from the previous year for each of the years. In 2002, the survey would begin the five year cycle again with an increase to 13,700 reporting

units (adjusted only for Round 1 split-offs) completing three core rounds of data collection to obtain calendar year data on health care utilization and expenditures. Coupled with data from the MCBS, this would provide the DHHS with the analytic capabilities first proposed for the 1996 NMES-3 with respect to sample size.

2.4 Dwelling Units, Reporting Units, and Other Definitions

The definitions for Dwelling Units and Group Quarters in the MEPS Household Component are generally consistent with the definitions employed for the NHIS. A Reporting Unit is a person or group of persons in the sampled dwelling unit that are related by blood, marriage, adoption or other family associations, who are to be interviewed at the same time in MEPS. Examples of discrete reporting units are:

1. a married daughter and her husband living with her parents in the same dwelling are considered one reporting unit.
2. a husband and wife and their unmarried daughter, age 18, who is living away from home at college constitute one family, but two reporting units.
3. three unrelated persons living in the same dwelling unit would be three reporting units.

College students under 24 years of age who usually live in the sampled household, but are currently living away from home and going to school, will be treated as separate reporting units for the purpose of data collection.

The 1996 MEPS sample consisted of households (dwelling units) that responded to the 1995 NHIS in the two panels reserved for the MEPS, with the basic analysis unit defined as the person. Analysis is planned with both the individual and the family as units. Through the reenumeration section of the Round 1 questionnaire, the status of each individual sampled at the time of the NHIS interview is classified as "key" or "non-key," "in-scope" or "out-of-scope," and "eligible" or "ineligible" for MEPS data collection. For an individual to be in-scope and eligible for person-level estimates derived from the MEPS household survey, the person needs to be a member of the civilian noninstitutionalized population for some period of time in the calendar year of analytical interest. Because a person's eligibility for the survey may have changed since the NHIS interview, sampling reenumeration takes place in each subsequent reinterview for persons in all households selected into the core survey. The keyness, in-scope, and eligibility indicators, together, define the target sample to be used for person-level national estimates. Only persons who are key, in-scope, and eligible for data collection will be considered in the derivation of person-level national estimates from the MEPS.

Key Persons: Key survey participants are defined as all civilian non-institutionalized individuals who resided in households that responded to the nationally representative NHIS subsample reserved for the MEPS (e.g. approximately 10,600 households from the 1995 NHIS), with the exception of college students interviewed at dormitories. Members of the armed forces that are on full-time active duty and reside in responding NHIS households which include other family members who are civilian non-institutionalized individuals are also to be defined as key persons, but will be considered out of scope for person-level estimates derived for the survey.

All other individuals who join the NHIS reporting units that define the 1996 MEPS household sample (in Round 1 or later MEPS rounds) and did not have an opportunity for selection during the time of the NHIS interview will also be considered key persons. These include newborn babies, individuals who were in an institution or outside the country moving to the United States, and military personnel previously residing on military bases who join MEPS reporting units to live in the community.

College students under 24 years of age interviewed at dormitories in the 1995 NHIS will be considered ineligible for the 1996 MEPS sample and not included in that sample. Furthermore, any unmarried college students under 24 years of age that responded to the 1995 NHIS interview while living away at school (not in a dormitory) will be excluded from the sample if it is determined in the MEPS Round 1 interview that the person is unmarried, under 24 years of age, and a student with parents living elsewhere who resides at his/her current housing only during the school year. If, on the other hand, the person's status at the time of the MEPS Round 1 interview is no longer that of an unmarried student under 24 years of age living away from home, then the person will be retained in the 1996 MEPS sample as a key person.

Alternatively, at the time of the MEPS Round 1 interview with NHIS sample respondents, a determination will be made if there are any related college students under 24 years of age who usually live in the sampled household, but are currently living away from home and going to school. These college students are considered key persons and will be identified and interviewed at their college address, but linked to the sampled household for family analyses. Some of these college students living away from home at the time of the Round 1 interview will have been identified as living in sampled household at the time of the 1995 NHIS interview. The remainder will be identified at the time of the MEPS Round 1 interview with the NHIS sampled households.

Non-key Persons: Persons who were not living in the original sampled dwelling unit at the time of the 1995 NHIS interview and who had a non-zero probability of selection for that survey will be considered non-key. If such persons happen to be living in sampled households (in Round 1 or later rounds), MEPS data (e.g., utilization and income) will be collected for the period of time they are part of the sampled unit to permit family analyses. Non-key persons who leave any sampled household will not be recontacted for subsequent interviews. Non-key individuals are not part of the target sample used to obtain person-level national estimates.

In situations where key persons from the NHIS sampled household selected for MEPS move out (in Round 1 or later rounds) and join or create another family, data on all members of this new household who are related by blood, marriage, adoption or foster care to the persons from the NHIS sampled household will be obtained from the point in time that the NHIS sampled person joined that new household. Similarly, data will be collected (in Round 1 and later rounds) on all related persons who join NHIS sampled households selected into the MEPS.

Persons in NHIS sampled households selected in the MEPS who subsequently enter an institution and leave the civilian, noninstitutionalized population of the United States will require data collection during their stay in institutions that are nursing homes. Alternatively, persons in NHIS sampled households selected in the MEPS who subsequently enter institutions that are not nursing homes and leave the civilian, noninstitutionalized population of the United States do not require any data collected in these institutions that are not nursing homes (this also applies for military service or moving out of the U.S.), but their whereabouts must be monitored during the field period. Upon their return to the U.S. civilian noninstitutional population, these persons shall once again be subject to HC data collection.

MEPS Data Collection Eligibility: In order for a MEPS reporting unit to be eligible for data collection, the unit must include at least one individual who is key and in-scope for some period of time during the reference period for a given round of data collection. If this condition holds, the persons who are key and in-scope and all other individuals who are members of the reporting unit (living together and related by blood, marriage, adoption or other family associations) are eligible for data collection in a given round of the MEPS.

2.5 Sample Size Targets and Precision Requirements

The 1996 MEPS sample size targets require approximately 9,000 reporting units yielding the complete series of core interviews (i.e., Rounds 1-3) to obtain use and expenditure data for calendar year 1996. The expected yield at each of the stages of data collection for each new MEPS sample linked to the NHIS is: (1) a NHIS response rate of 94 percent at the household level; (2) a response rate of 85 percent (83 percent achieved for the 1996 MEPS) among reporting units at Round 1 (conditioned on a completed NHIS interview); a round-specific response rate of 95 percent among reporting units at Rounds 2; a round-specific response rate of 97.5 percent among reporting units at Round 3; a round-specific response rate of 97 percent among reporting units at Rounds 4 and 5; and a round-specific response rate among reporting units of 98 percent at Round 6 (See Table 1). Consequently, the targeted response rate for obtaining calendar year 1996 data on health care utilization and expenditures from the 1996 MEPS sample is 77 percent, conditioned on response to the NHIS (interviews for Rounds 1-3), or 72 percent overall.

The response rate target for the core MEPS household survey for obtaining calendar year 1997 data on health care utilization and expenditures from the new 1997 MEPS sample is 79 percent conditioned on response to the NHIS (interviews for Rounds 1-3), or 74 percent overall (See Table 1). Furthermore, the minimum acceptable response rate target for the core MEPS household survey within a PSU is 65 percent for calendar year 1997 data from the new MEPS panel, conditioned on NHIS response (interviews for Rounds 1-3), and is 60 percent for calendar years 1996 and 1997 for the 1996 MEPS panel (interviews for Rounds 1-5, conditioned on response to the NHIS).

It should be noted that the 1995 NHIS response rate achieved for the households eligible for the MEPS was 94 percent. Of 10,639 responding NHIS dwelling units eligible for the MEPS, 99.6 percent were identified with the necessary information to facilitate MEPS data collection. Of the 11,424 eligible reporting units targeted for interviews in Round One, 9,488 responded to the first core MEPS interview (83.1 percent). Overall, the joint NHIS - Round One response rate for the 1996 MEPS household survey was 77.7 percent ($.939 \times .996 \times .831$).

Table 1. Expected number of responding reporting units and associated response rate for each round of data collection of the 1996 and the 1997 MEPS Household Component.

	1995 NHIS Linked Sample	Calendar Year 1996		Calendar Year 1997		Calendar Year 1998	
		Round 1A	Round 2A	Round 3A	Round 4A	Round 5A	Round 6A
1996 MEPS Panel							
Responding Reporting Units (by Round)	¹ 11,424 ² 10,800	¹ 9,488	³ 9,018	³ 8,792	³ 8,528	³ 8,272	³ 8,106
(Response rate by Round)	(94%)	(83%)	(95%)	(97.5%)	(97%)	(97%)	(98%)

	1996 NHIS Linked Sample			Calendar Year 1997		Calendar Year 1998	
				Round 1B	Round 2B	Round 3B	Round 4B
1997 MEPS Panel							
Responding Reporting Units (by Round)	¹ 6,857 ² 6,480			¹ 5,828	³ 5,536	³ 5,397	³ 5,235
(Response rate by Round)	(94%)			(85%)	(95%)	(97.5%)	(97%)

¹ Includes Round 1 "split-offs" (family member(s) that move apart from the originally sampled household) in Round 1 of the 1996 and 1997 MEPS panels.

² Original sample of Reporting Units.

³ Does not include new split-offs after Round 1 in counts.

The estimates of response rates in Table 1 are for the original sample of NHIS responding reporting units, with the inclusion of split-offs in Round 1. The rates specified in the table are also expected to apply to split-offs in subsequent rounds, i.e., households that will be created in the course of the survey field period as a result of key persons moving away from originally sampled NHIS households.

Source: Agency for Health Care and Policy Research. 1996 Medical Expenditure Panel Survey—Household Component.

The sample size specifications have been set to meet precision requirements developed for the MEPS. Given the major changes in the design of the survey that were required as a consequence of the DHHS Survey Integration Plan, the sample size constraints placed on the MEPS as a consequence of restricting the sample to the 195 PSU NHIS subsample, and use of the first quarter of the 1995 NHIS sample for inclusion in a Disability Survey sponsored by the Assistant Secretary of Planning and Evaluation, DHHS, the precision requirements for the first year of the MEPS were relaxed relative to the original design specifications of the NMES-3 (Cohen, 1996; DiGaetano, 1994).

For the 1996 MEPS sample, the relative standard error for a population estimate of 20 percent for the overall population at the family level was specified to be no more than 2.7 percent; and the relative standard error for a population estimate of 20 percent for the overall population at the person level was

specified to be no more than 1.7 percent. For example, if it was determined that the national population estimate of the percentage of the population ever uninsured in 1996 was 20 percent, the standard error of the estimate should not exceed 0.34 percent. That would translate to a 95 percent confidence interval of (19.33%, 20.67%) for the insurance coverage estimate that characterized the nation at the person level. Preliminary design work suggested that a 1996 MEPS sample selected from a nationally representative 1995 NHIS subsample characterized by 195 PSUs, 1,675 segments, and approximately 9,000 responding households at the end of Round 3, with disproportionate sampling rates that ranged from 1.0 to 0.5, should yield average design effects for MEPS survey estimates of annual use and expenditure measures in the 1.5-1.6 range.

The 1996 MEPS sample linked to the NHIS was designed to produce unbiased estimates for the four Census regions. This NHIS linked sample reflects an oversample of Hispanics and blacks at the following ratios of representation relative to the remaining households (Hispanics 2.0:1, blacks 1.5:1). The overall expected sample yield after three rounds of data collection at the person level is approximately 22,000 overall, with 3,400 black/non-Hispanic individuals and 4,200 Hispanic individuals. The average design effect target for survey estimates for the 1996 MEPS is 1.6. The sample design should satisfy the following precision requirements for mean estimates of the following measures of health care utilization and expenditures at the person level: (total health expenditures; utilization and expenditure estimates for inpatient hospital stays; physician visits; dental visits and prescribed medicines).

Demographic group	Persons at the end of Round 3	Average relative standard error
1. Black/Non-Hispanics	3,400	.065
2. Hispanics	4,200	.055
3. Overall Population	22,000	.025

2.6 Procedures for Data Collection

For a description of the preliminary contact with households responding to the NHIS and subsampled as part of a MEPS panel, see "Design and Methods of the Medical Expenditure Panel Survey, Household Component" by Joel Cohen.

HC Main Rounds 1-5

Five interviews will be conducted with each NHIS panel selected for the MEPS at three- to four-month intervals over an approximately 24-month field period. The first three of these rounds (Rounds 1A-3A) define the 1996 MEPS Household Component, and will collect the main body of annual utilization and expenditure data for calendar year 1996. Rounds 3A-5A of the 1996 MEPS panel will be combined with Rounds 1B-3B of the 1997 MEPS panel to yield the sample base for the 1997 MEPS Household Component and the source of annual estimates for that calendar year. All interviews will be conducted in person through a Computer-assisted Personal Interview (CAPI) as the principal data collection mode. Round 1 will ask about the period since January 1 of the MEPS year to the date of that interview; Round 2 will ask about the time since the Round 1 interview through the date of the Round 2 interview; and

Round 3 will collect data since the date of the Round 2 interview through the date of the Round 3 interview in 1997.

Questionnaires for these field rounds will parallel those used in 1987 NMES with some modifications implemented for the 1992 Feasibility Study and with further changes indicated by the latter experience and the FAMES (NMES-3) pretest. The instruments contain items that are asked once in the life of the study, items that are asked repeatedly in each round, and items that are updated in later rounds. Questions asked only once include basic sociodemographic characteristics. Core questions asked repeatedly include health status, health insurance coverage, employment status, days of restricted activity due to health problems, medical utilization, hospital admissions, and purchase of medicines. For each health encounter identified, data will be obtained on the nature of health conditions, the characteristics of the provider, the services provided, the associated charges, and sources and amounts of payment.

Permission forms for medical providers and for sources of employment and private health insurance coverage will be collected in the field. Under this design, anyone who reports being employed but not covered by private health insurance will be asked to sign a permission form that will allow contact with the employer. A sample of medical providers identified by MEPS respondents will be contacted in the survey of medical providers, MPC, to verify and supplement information provided by the family respondent in the household interview; employers and other health insurance providers will be contacted in the survey of health insurance providers, IC, to verify analogous insurance information and to collect other information on insurance characteristics that household respondents would not typically know.

As a consequence of a successful test in the Feasibility Study, copies of policies providing private insurance coverage to sampled persons will be collected from household respondents. These requests will be initiated in Round 1 and will be followed up in Round 2 for eligible individuals who have not provided copies of their policies at the time of the first request. Sampled persons will be asked to provide the policies directly or to obtain them from their health insurance providers. A description of the type of documents to be collected, a list of the policies identified by the respondent, and request forms to be given to providers will be given to interviewing staff to assist in this effort.

HC Main Round 6

Round 6 is concerned with obtaining valuable ancillary information before a MEPS panel is retired. For the 1997 MEPS, it will take place after April 15, 1998 and ask for tax filing information details. Comparable information will be collected for the 1996 panel in Round 4 after April 15, 1997. Administration of the majority of Round 6 interviews will be by telephone from the interviewers' homes; in-person interviews will be conducted for those respondents without access to a suitable telephone or for those for whom telephone administration is not feasible, e.g., respondents with hearing or comprehension problems.

3.0 Summary

The benefits of the redesigned MEPS include significant cost savings, enhanced analytical capacities, increased opportunities for longitudinal analyses, reduction of major data gaps, and major improvements in providing timely data access to the research community at large. The MEPS will provide information

to help understand how the dramatic growth of managed care, changes in private health insurance, and other dynamics of today's market-driven health care delivery system have affected, and are likely to affect, the kinds, amounts, and costs of health care that Americans use. The survey will also provide necessary data for projecting who benefits from and who bears the cost of changes to existing health policy and the creation of new policies.

The MEPS data will serve as the primary source to inform research efforts which examine how health care use and expenditures vary among different sectors of the population, such as the elderly, veterans, children, disabled persons, minorities, the poor, and the uninsured; and how the health insurance of households varies by demographic characteristics, employment status and characteristics, geographic locale, and other factors. The MEPS data will provide answers to questions about private health insurance costs and coverage, such as how employers' costs vary by region, and help evaluate the growing impact of managed care and of enrollment in different types of managed care plans.

The first MEPS data will be available on public use data tapes starting as early as spring 1997. MEPS data also will be used in a series of studies to be published by AHCPR, and by Agency and other researchers publishing in the scientific literature. As a consequence of the shift to a continuous ongoing annual survey, additional efficiencies in survey data collection, data editing and imputation tasks will be realized, as well as further improvements in the timely release of MEPS data products to the research community.

4.0 References

Arnett RA, Hunter E, Cohen S, Madans J, Feldman J. The Department of Health and Human Services' Survey Integration Plan. Proceedings of the American Statistical Association, section on Government Statistics; 1996 Aug; Chicago (IL).

Cohen SB. The redesign of the Medical Expenditure Panel Survey: A component of the DHHS Survey Integration Plan. Proceedings of the COPAFS Seminar on Statistical Methodology in the Public Service; 1996 Nov; Bethesda (MD).

DiGaetano R. Sample design of the Household Component of the National Medical Expenditure Survey (NMES-3). Draft report. Rockville (MD): Westat, Inc.; 1994.

Hunter E, Arnett R, Mathiowetz N, Cohen S, Madans J, Feldman J. HHS Survey Integration Plan: Background materials, 1995.

Judkins D, Marker D, Waksberg J. National Health Interview Survey: Research for the 1995 redesign. Draft report prepared for the National Center for Health Statistics. Westat, Inc.; 1994.

Appendix E



UNIFORMED SERVICES UNIVERSITY OF THE HEALTH SCIENCES

4301 JONES BRIDGE ROAD
BETHESDA, MARYLAND 20814-4799



(Revised Corrected Copy)

May 28, 2002

MEMORANDUM FOR NICOLE A. VAUGHN, DEPARTMENT OF MEDICAL AND
CLINICAL PSYCHOLOGY

SUBJECT: IRB Approval of Protocol T072EV for Human Subject Use

Your research protocol entitled *"Examining the Impact of Health Insurance Status on the Health Care Access, Utilization Patterns and Quality of Care Among Ethnic Minorities and Caucasians with Type 2 Diabetes,"* was reviewed and approved for execution on 4/9/02 as an exempt human subject use study under the provisions of 32 CFR 219.101 (b)(4). This approval will be reported to the full IRB scheduled to meet on May 9, 2002.

The purpose of this project is to examine the impact of ethnicity on healthcare access, utilization, and quality of care among insured adults with Type 2 diabetes. This study will use the 1998 Medical Expenditure Panel Survey (MEPS) database. The database is available from the Center for Cost and Financing Studies (CCFS), Division of Survey Operations, Agency for Healthcare Research and Quality, DHHS. There are no personal identifiers on the database.

➤ Please disregard the revision of data set memo sent on 23 May 2002.

Please notify this office of any amendments you wish to propose and of any untoward incidents which may occur in the conduct of this project. If you have any questions regarding human volunteers, please call me at 301-295-3303.

Kathryn H. Knudson, Ph.D.

LTC, MS, USA

Human Research Protections Program

Administrator and Executive Secretary, IRB

cc: Director, Research Administration



Appendix F

A. DATA USE AGREEMENT

Individual identifiers have been removed from the micro-data contained in the files on this CD-ROM. Nevertheless, under sections 308 (d) and 903 (c) of the Public Health Service Act (42 U.S.C. 242m and 42 U.S.C. 299 a-1), data collected by the Agency for Healthcare Research and Quality (AHRQ) and/or the National Center for Health Statistics (NCHS) may not be used for any purpose other than for the purpose for which it was supplied; any effort to determine the identity of any reported cases is prohibited by law.

Therefore in accordance with the above referenced Federal Statute, it is understood that:

1. No one is to use the data in this data set in any way except for statistical reporting and analysis; and
2. If the identity of any person or establishment should be discovered inadvertently, then (a) no use will be made of this knowledge, (b) the Director Office of Management AHRQ will be advised of this incident, (c) the information that would identify any individual or establishment will be safeguarded or destroyed, as requested by AHRQ, and (d) no one else will be informed of the discovered identity; and
3. No one will attempt to link this data set with individually identifiable records from any data sets other than the Medical Expenditure Panel Survey or the National Health Interview Survey.

By using this data you signify your agreement to comply with the above stated statutorily based requirements with the knowledge that deliberately making a false statement in any matter within the jurisdiction of any department or agency of the Federal Government violates 18 U.S.C. 1001 and is punishable by a fine of up to \$10,000 or up to 5 years in prison.

The Agency for Healthcare Research and Quality requests that users cite AHRQ and the Medical Expenditure Panel Survey as the data source in any publications or research based upon these data.

CCFS Data Center Application	
1. Name:	Nicole A. Vaughn, M.S.
2. Institutional Affiliation:	Uniformed Services University of the Health Sciences
3. Project Title:	"Examining the Impact of Health Insurance Status on the Health Care Access and Utilization Patterns and Quality of Care of Ethnic Minorities and Caucasians with Type 2 Diabetes"
4. Phone Number: Fax Number:	Tel: 301-295-9664 Fax: 301-295-3034 301-847-1940
5. Email Address:	nvaughn@usuhs.mil
6. Mailing Address:	Dept. of Medical and Clinical Psychology 4301 Jones Bridge Road Bethesda, MD 20814
7. Is your project related to a dissertation or other degree requirement?	
This project is related to a dissertation.	
8. List the source(s) of funding (if any) for the project.	
This project is funded by a university student research grant.	
9. I have read the "CCFS Data Center User Guide" and understand that microdata used in the analysis will not be released, and that release of summary data (tables, parameter estimates) is dependent on a confidentiality review.	
Yes, I have read the CCFS Data Center User Guide agreement.	
10. List below the MEPS data file(s) you are requesting access to (i.e. 1996 HC-IC file, MPC). Please include any PUF files you may need access to.	

1998 HC Demographic, Insurance, and Health Status file, 1998 HC Access to Care supplement, 1998 HC Alternative and Preventive Medicine supplement file, 1998 HC Emergency Room Visits File (HC-026E), 1998 HC Hospital Inpatient stays file (HC-026D), 1998 Medical conditions file, 1998 Medical Provider component, 1998 Office-based Medical Provider visits file (HC-026G), 1998 HC Outpatient Department visits file (HC-026F), 1998 HC Prescribed Medicines file (HC-026A) and 1998 Provider Probes Visits file.

11. List below any MEPS-HC variables by instrument section and question number that are not available for public use which you are requesting access to.

1)1998 Medical Provider component-Medical Event Booklet for Office Based Providers question numbers: 3, 4a, 4b, 12a, 12b, 14a

2)1998 Medical Provider component- Medical Provider Survey-Hospital Event form question numbers: 1, 2a, 2b, 2c, 3, 4a, 4b, 4c, 4d, 6b, 13b, 15, 16a, 16b

3)1998 Medical Provider component-Medical Event form for Separately Billing Doctors question numbers: 1d, 2a, 2b, 3a, 3b

4)1998 Provider Probes Visits question numbers: PP01, PP02, PP03, PP03A, PP04, PP05, PP06, PP07, PP12, PP19, PP20, PP21, PP22, PP27

12. If you have data that you want to merge with CCFS data describe how and why the merge is to be done in your research summary (item #17), and below describe the content of the data to be merged. Also, attach documentation for each file to be merged, including file layout, number of records, variable names and descriptive variable labels. Data will not be merged unless the documentation is complete, including variable labels and value labels. The merging of files requiring the use of identifying or potentially identifying data will be conducted by our contractor. Complex merges may require the researcher to enter into a task order agreement with the data processing contractor. A cost estimate will be provided once the application is approved. If merging State level data, there must be data for each State, and State identifiers will be removed or encrypted after the merge is complete. The resulting data set will be considered restricted and its use limited to the CCFS Data Center.

Data available for the Public Use Files will be merged with portions of the Medical Provider Component data. This data is to be merged in order to analyze between group differences among ethnic minorities and Caucasians with a diagnosis of Type 2 diabetes. Only data from adults aged 25-64 will be used. Please see attached list of files and variables needed for this study. A detailed list of variable labels is attached.

13. Please provide an estimated time frame for completing your Data Center project and how often you would like to have access to the Data Center, and with what frequency (daily for two weeks, weekly for two months, etc). Please be aware that it can take four to six weeks after your project has been approved to have your data files made available to you in the Data Center.

I would like to have access to the data center for 3-4 days a week for 5-6 months in order to complete my doctoral work.

14. Please list your publication plans or other anticipated uses of the data/research results.

After completing the analysis of data for my dissertation, I anticipate publishing the results in a peer-reviewed journal and presenting the data at national conferences.

15. List below the persons other than yourself that will be working on this project who may access the Data Center.

Cara Olsen, M.S.

16. List below the software that you need access to in the Data Center:

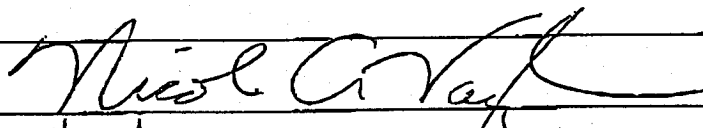
STATA and SPSS

17. Attach the following items:

- Cover letter addressed to the Manager of the CCFS Data Center.
- Resume or Curriculum Vitae for all persons associated with the project that will access the Data Center.
- For students, a letter from the department chair confirming your student status and that the project is related to a degree requirement.
- Abstract of the proposed research, not to exceed two pages.
- Summary of the proposed research, including a description of why publicly available data are inadequate. The summary should include the kind of output you want to remove from the Data Center. On what page of the summary is this output specified?
- Notice of IRB review.
- If merging data, a letter from the data sponsor giving the CCFS Data Center permission to keep the data and to make it available to other Data Center users.

I assert that the above and attached information is, to the best of my knowledge, true and complete.

Signed:



Date:

5/17/02

From: <wcarroll@ahrq.gov>
To: <nvaughn@usuhs.mil>
Date: 7/22/03 1:42PM
Subject: RE: Proposal Attached

Hi Nicole,

There is not an approval letter for your project, but there is an approval e-mail, which is below. I will fax the application in a few minutes.

Sam's phone number is 301-427-1673.

Good-luck!
Bill

-----Original Message-----

From: Carroll, A William
Sent: Tuesday, June 18, 2002 1:18 PM
To: 'Nicole Vaughn'
Cc: Carroll, A William
Subject: RE: Proposal Attached

Nicole,

Your Data Center application has been approved (minus the use of the Medical Provider Component). Access to the Data Center is restricted to Monday through Friday, 9:00am to 4:30pm, by appointment only. The Data Center has three terminals available and one will be reserved for you when you schedule the days you will be here.

You can work with the different files yourself to create your analytic file, or you can contract with our data processing contractor to create the analytic file. They will charge you \$80 per hour for the programming work to create the file. If you choose to do this I will create the task order and send it to them. They will then provide a cost estimate and you can decide at that time whether to have them do the work or to do it yourself.

If you choose to do all the programming yourself there will not be any cost to you for using the Data Center. Since you are a student the \$250 application fee is waived.

Please let me know how you want to proceed.

Bill Carroll

-----Original Message-----

From: Nicole Vaughn [mailto:nvaughn@usuhs.mil]
Sent: Monday, June 17, 2002 10:37 PM
To: Carroll, A William
Subject: RE: Proposal Attached

Yes it is a go. I thought that the agency was still reviewing my protocol??

Please let me know if I have been approved.

Thanks,
Nicole

<<< <wcarroll@ahrq.gov> 6/17 1:01p >>>
Nicole,

I have not heard from you since your conversation with Doris Lefkowitz. Do you intend to pursue your Data Center project?

Bill Carroll

-----Original Message-----

From: Nicole Vaughn [mailto:nvaughn@usuhs.mil]
Sent: Friday, May 31, 2002 11:28 AM
To: Carroll, A William
Cc: Nicole Vaughn
Subject: Proposal Attached

Bill,

Attached is the proposal to complete my application. This is a copy of the proposal that went to the university IRB. Let me know if there are any problems opening this.

I look forward to hearing from you in the next couple weeks.

Thanks,
Nicole Vaughn, M.S.
Graduate Fellow
Medical Psychology
USUHS
Bethesda, MD
301-295-9664

Appendix G

Variables Selected for Dissertation and Coding Scheme

1998 Demographic, Insurance, and Health Status Variables Source Crosswalk

Variable	Label	Source
Demographic Variables		
AGE98X	Age-12/31/98 edited/imputed	RE 12, 57-66
AGE (continuous)		
AGE Categories (categorical)		
AGECAT1= 21-29 years		
AGECAT2= 30-39 years		
AGECAT3= 40-49 years		
AGECAT4= 50-59 years		
AGECAT5= 60-64 years		
SEX (categorical)		RE 12, 57, 61
1=male		
2=female		
RACEX	Race (edited/imputed)	RE 101, 102
RACETHNX	Race/ethnicity (edited/imputed)	RE 98-102
RACE (categorical)		
1=Caucasian/White		
2=African American/Black		
3=Hispanic/Latino		
4=Other		
MARRY98X	Marital Status-12/31/98 (edited/imputed)	RE 13, 97
MARRY (categorical)		
1=married		
2=widowed		
3=divorced		
4=separated		
5=never married/single		
6=under 16-n/a		
EDUCYR98	Completed years of education-12/31/98	RE 103-105
EDUCYR (continuous)		
0=never attended school/kindergarten		
1-8=elementary grades 1-8		
9-11=high school grades 9-11		
12=grade 12		
13= 1 yr of college		
14= 2 yrs of college		
15=3 yrs of college		
16=4 yrs of college		

HIDEG98	Highest degreee-12/31/98	RE 103-105
HIDEG (categorical)		
1=no degree		
2=GED		
3=High School diploma		
4=Bachelor's degree		
5=Master's degree		
6=Doctorate degree		
7=Other degree		
8=under 16-n/a		

REGION98 (Categorical)	Census region
1=Northeast	
2=Midwest	
3=South	
4=West	

FAMS1231 (Continuous)	Family size responding(in persons)	Constructed
FAMSZE98 (Continuous)		

Income Variables

MEXAMT98	Total amount for medical expenses (in \$)	IN12
TTLP98X (Continuous)	Person's total income	constructed
POVCAT98 (Categorical)	Family income as a percent of poverty line	constructed
1=negative or poor		
2=near poor		
3=low income		
4=middle income		
5=high income		
PUBP98X (Continuous)	Person's public assistance	constructed

Employment Variables

EMPST (Categorical)
1=employed
2=unemployed

Occupation Variables

COCCP31	Condensed occupation code Rd 3/1 CMJ	EM99-100; RJ 01
COCCP42	Condensed occupation code Rd 4/2 CMJ	EM99-100; RJ 01
COCCP53	Condensed occupation code Rd 5/3 CMJ	EM99-100; RJ 01
OCCUP (Categorical)		
1= professional, technical and kindred		

2=managerial and administrative
 3=sales worker
 4=clerical and kindred workers
 5=craftsmen and foremen
 6=operatives
 7=transport operatives
 8=service workers
 9=laborers, not farming
 10=farm owners and managers
 11=farm laborers and foremen
 12=unclassifiable occupation
 13=active military

Health Insurance Variables

INSCOV98	Health insurance coverage indicator 98	constructed
1=any private		
2=public only		

ANYINS (Categorical)	Any type of insurance coverage in 1998
1=yes	
0=no	

Health Status Variables

RTHLTH31	Perceived health status (R3-R1)	CE 1
RTHLTH42	Perceived health status (R4-R2)	CE 1
RTHLTH53	Perceived health status (R5-R3)	CE 1
RTHLTH/HLTHSTAT (Categorical)		
1=excellent		
2=very good		
3=good		
4=fair		
5=poor		

MNHLTH31	Perceived mental health status (R3-R1)	CE 2
MNHLTH42	Perceived mental health status (R4-R2)	CE 2
MNHLTH53	Perceived mental health status (R5-R3)	CE 2
MNHLTH (Categorical)		
1=excellent		
2=very good		
3=good		
4=fair		
5=poor		

Preventive Care Variables

DENTCK98 (Categorical)	frequency of dental checkups
1= <1 yr	

2=>1 yr
-1=n/a ---will be coded as 2

BLDPCK98 (Categorical) time since last blood pressure chk by health prof
1=<1 yr
2=>1 yr
-1=n/a ---will be coded as 2

CHOLCK98 (Categorical) time since last cholesterol check
1=<1 yr
2=>1 yr
-1=n/a ---will be coded as 2

PHYSCL98 (Categorical) time since last complete physical
1=<1 yr
2=>1 yr
-1=n/a ---will be coded as 2

FLUSHT98 (Categorical) time since last flu shot
1=<1 yr
2=>1 yr
-1=n/a ---will be coded as 2

NUTRIT98 (Categorical) person received nutritional advice in 1998
1=yes
2=no

Characteristics of Other Medical Expenses

TOTSLF98 (Continuous) Total amt paid by self/family 1998
OPDRV98 (Continuous) # office-based physician visits
OBOPTO98 (Continuous) # office-based optometrist visits
DVGEN98 (Continuous) # general dentist visits
DVGEXP98 (Continuous) total general dentist expenses
RXTOT98 (Continuous) # prescribed meds incl refills
RXEXP98 (Continuous) total Rx-expenses 1998
RXSLF98 (Continuous) total Rx-paid by self-family 98

Appendix H

```
#delimit ;
clear;
set mem 200000;
```

```
*-----
* This example illustrates the following activities:
*   Use the condition file to identify events for diabetes
*   Link conditions to events
*   For each event, construct variables with the same name across events
*   Combine facility and doctor expenditures
*   Combine event files, identify type of event
*   Aggregate event-level records to person level
*   Construct an 'annualized' variable from round-specific variables
*   File created January 2003--has specific 5-digit ICD 9 codes
*-----;
```

```
log using "h:\Nicole\NicoleLog42003.log", replace;
```

```
/* Identify Diabetes CONDITION */
use "h:\Nicole\cond98x.dta";
keep condidx icd9code dupersid hhnum hsnun opnum obnum dnnum ernum rxnum condbegy seedrev1 seedrev2 seedrev3
seedrev4
seedrev5 ltsaw1 stiltr1 stiltr2 stiltr3 stiltr4 stiltr5;
keep if icd9code == "250.00" | icd9code == "250.02" | icd9code == "250.10" | icd9code == "250.12" | icd9code == "250.20"
| icd9code == "250.22" | icd9code == "250.30" | icd9code == "250.32" | icd9code == "250.62" | icd9code == "250.92"
| icd9code == "250.70" | icd9code == "250.40" | icd9code == "250.42" | icd9code == "250.72" | icd9code == "250.50"
| icd9code == "250.80" | icd9code == "250.52" | icd9code == "250.82" | icd9code == "250.60" | icd9code == "250.90";
sort dupersid;
generate dupflg=.;
by dupersid: replace dupflg=1 if _n > 1 & _n<=_N;
by dupersid: replace dupflg=1 if dupflg[_n+1]==1 & _n==1;
tab1 dupflg;
list dupersid if dupflg==1;
sort condidx;
tab1 icd9code;
save "h:\Nicole\h27temp03.dta", replace;
```

```
/* Merge on the Conditions to Events Linking Variable */
use "o:\STATA PUF Files\h26if1.dta", clear;
keep condidx evtidx;
sort condidx;
merge condidx using "h:\Nicole\h27temp03.dta";
tab1 _merge;
keep if _merge==3;
sort evtidx; /* sort by evtidx for merges with event files */
generate eventflg=.;
by evtidx: replace eventflg=1 if _n > 1 & _n<=_N;
by evtidx: replace eventflg=1 if eventflg[_n+1]==1 & _n==1;
generate str2 vstype=".";
generate ambtotev=0;
generate ambfamev=0;
drop condidx _merge;
save "h:\Nicole\condevnt03.dta", replace;
```

```
/*Identifying people w/ Conditions but no Events */
use "o:\STATA PUF Files\h26if1.dta", clear;
keep condidx evtidx;
```

```

sort condidx;
merge condidx using "h:\Nicole\h27temp03.dta";
tab1 _merge;
keep if _merge==2;
generate str2 vstype=".";
generate ambtotev=0;
generate ambfamev=0;
drop condidx _merge;
save "h:\Nicole\noevents03.dta", replace;

```

/* Merge on the Office-Based Events */

```

use "o:\STATA PUF Files\h26gf1.dta", clear;
keep evntidx obxp98x obsf98x eeg ekg seetlkpv referdby seedoc medtype timespnt docatloc vstctgry vstrelcn physth occupth
speechth kidneyd ivther psychoth labtest sonogram xrays mammog mri rcvvac anesth othsvce surgproc surgname medpresc
obicd1x obicd2x obicd3x obicd4x obpro1x obccc1x obccc2x obccc3x obccc4x;
sort evntidx;
merge evntidx using "h:\Nicole\condevnt03.dta";
tab1 _merge;
keep if _merge==3;
replace vstype="ob";
replace ambtotev=obxp98x; /* total cost for event */
replace ambfamev=obsf98x; /* total out-of-pocket cost for event */
drop _merge;
save "h:\Nicole\mvis03.dta", replace;

```

/* Merge on Outpatient Department Events */

```

use "o:\STATA PUF Files\h26ff1.dta", clear;
keep evntidx opxp98x opfsf98x opdsf98x opdateyr opdatemm opdateddd eeg ekg referdby seedoc medtype timespnt
vstctgry vstrelcn physth occupth speechth kidneyd ivther psychoth labtest sonogram xrays mammog mri
rcvvac anesth othsvce surgproc surgname medpresc docoutf opicd1x opicd2x opicd3x opicd4x oppro1x opccc1x opccc2x
opccc3x opccc4x;
sort evntidx;
merge evntidx using "h:\Nicole\condevnt03.dta";
tab1 _merge;
keep if _merge==3;
replace vstype="op";
replace ambtotev=opxp98x; /* total cost for event */
replace ambfamev=opfsf98x+opdsf98x; /* total out-of-pocket cost for event */
drop _merge;
save "h:\Nicole\opat03.dta", replace;

```

/* Merge on Hospital Inpatient Events */

```

use "o:\STATA PUF Files\h26df1.dta", clear;
keep evntidx ipxp98x ipdsf98x ipfsf98x ipbegyr ipbegmm ipbegdd ipendyr ipendmm ipenddd numnighx numnight
emerroom specond rsinhos anyoper surgproc ipicd1x ipicd2x ipicd3x ipicd4x ippro1x ippro2x ipccc1x
ipccc2x ipccc3x ipccc4x dschpmed droutsid;
sort evntidx;
merge evntidx using "h:\Nicole\condevnt03.dta";
tab1 _merge;
keep if _merge==3;
replace vstype="ip";
replace ambtotev=ipxp98x; /* total cost for event */
replace ambfamev=ipdsf98x+ipfsf98x; /* total out-of-pocket cost for event */
drop _merge;
save "h:\Nicole\ipat03.dta", replace;

```

```

/* Merge on Emergency Department Events */
use "o:\STATA PUF Files\h26ef1.dta", clear;
keep evntidx erxp98x erfsf98x erdsf98x erdateyr erdatemm erdatedd seedoc vstctgry vstrelcn labtest sonogram xrays
mammog mri ekg eeg rcvvac anesth othsvce surgproc surgname medpresc docoutf ericd1x ericd2x ericd3x erpro1x
erccc1x erccc2x erccc3x;
sort evntidx;
merge evntidx using "h:\Nicole\condevnt03.dta";
tab1 _merge;
keep if _merge==3;
replace vistype="er";
replace ambtottev=erxp98x; /* total cost for event */
replace ambfamev=erdsf98x+erfsf98x; /* total out-of-pocket cost for event */
drop _merge;
save "h:\Nicole\erom03.dta", replace;

```

```

/* Merge on Home Health Events */
use "o:\STATA PUF Files\h26hf1.dta", clear;
keep evntidx hhsf98x hhxp98x;
sort evntidx;
merge evntidx using "h:\Nicole\condevnt03.dta";
tab1 _merge;
keep if _merge==3;
replace vistype="hh";
replace ambtottev=hhxp98x; /* total cost for event */
replace ambfamev=hhsf98x; /* total out-of-pocket cost for event */
drop _merge;
save "h:\Nicole\hhcare03.dta", replace;

```

```

/* Merge on Prescribed Medicine Event */
use "o:\STATA PUF Files\h26a.dta", clear;
keep rxrecidx linkidx rxsf98x rxxp98x rxbegdd rxbegmm rxbegyr rxname rxhhname rxndc rxform rxstreng rxunit
rxunitos phartp1 phartp2 phartp3 phartp4 phartp5 phartp6 phartp7 rxicd1x rxicd2x rxicd3x rxccc1x rxccc2x
rxccc3x;
rename linkidx evntidx;
sort evntidx;
merge evntidx using "h:\Nicole\condevnt03.dta";
tab1 _merge;
keep if _merge==3;
replace vistype="pm";
replace ambtottev=rxxp98x; /* total cost for event */
replace ambfamev=rxsf98x; /* total out-of-pocket cost for event */
drop _merge;
save "h:\Nicole\pmed03.dta", replace;

```

```

/* Merge on Other Medical Expense Events */
use "o:\STATA PUF Files\h26cf1.dta", clear;
keep evntidx omxp98x omsf98x omtypex;
sort evntidx;
merge evntidx using "h:\Nicole\condevnt03.dta";
tab1 _merge;
keep if _merge==3;
replace ambtottev=omxp98x; /* total cost for events */
replace ambfamev=omsf98x; /* total out-of-pocket cost for events */
drop _merge;
save "h:\Nicole\otmed03.dta", replace;

```

```

/* Combine all Events, except Other Medical Expense, which has no Events, and persons with */

```

```

/* condition but no corresponding events */
use "h:\Nicole\mvis03.dta", clear;
append using "h:\Nicole\opat03.dta";
append using "h:\Nicole\ipat03.dta";
append using "h:\Nicole\erom03.dta";
append using "h:\Nicole\hhcare03.dta";
append using "h:\Nicole\pmed03.dta";
append using "h:\Nicole\noevents03.dta";
sort evtidx; /* sort by evtidx to identify duplicate events */
tab1 eventflg;
list evtidx ambtottev ambfamev if eventflg==1;
sort dupersid evtidx;
by dupersid evtidx: drop if eventflg==1 & _n>1;
tab1 dupersid;

generate numeeg=0;
recode eeg -1 -7 -8 -9 2 95 .=0;
tab1 eeg;
sort dupersid eeg;
by dupersid eeg: replace numeeg=_N if eeg==1; /* count the # eeg per person */
tab1 numeeg;
by dupersid: replace numeeg=numeeg[_N];
tab1 numeeg;
tab1 vistype;

generate numekg=0;
recode ekg -1 -7 -8 -9 2 95 .=0;
tab1 ekg;
sort dupersid ekg;
by dupersid ekg: replace numekg=_N if ekg==1; /* count the # ekg per person */
tab1 numekg;
by dupersid: replace numekg=numekg[_N];
tab1 numekg;
tab1 vistype;

generate numlab=0;
recode labtest -1 -7 -8 -9 2 95 .=0;
tab1 labtest;
sort dupersid labtest;
by dupersid labtest: replace numlab=_N if labtest==1; /* count the # labtests per person */
tab1 numlab;
by dupersid: replace numlab=numlab[_N];
tab1 numlab;
tab1 vistype;

generate numsono=0;
recode sonogram -1 -7 -8 -9 2 95 .=0;
tab1 sonogram;
sort dupersid sonogram;
by dupersid sonogram: replace numsono=_N if sonogram==1; /* count the # sonogram per person */
tab1 numsono;
by dupersid: replace numsono=numsono[_N];
tab1 numsono;
tab1 vistype;

generate numxray=0;
recode xrays -1 -7 -8 -9 2 95 .=0;

```

```

tab1 xrays;
sort dupersid xrays;
by dupersid xrays: replace numxray=_N if xrays==1; /* count the # xrays per person */
tab1 numxray;
by dupersid: replace numxray=numxray[_N];
tab1 numxray;
tab1 vistype;

```

```

generate nummri=0;
recode mri -1 -7 -8 -9 2 95 .=0;
tab1 mri;
sort dupersid mri;
by dupersid mri: replace nummri=_N if mri==1; /* count the # mri per person */
tab1 nummri;
by dupersid: replace nummri=nummri[_N];
tab1 nummri;
tab1 vistype;

```

```

generate numanes=0;
recode anesth -1 -7 -8 -9 2 95 .=0;
tab1 anesth;
sort dupersid anesth;
by dupersid anesth: replace numanes=_N if anesth==1; /* count the # anesth per person */
tab1 numanes;
by dupersid: replace numanes=numanes[_N];
tab1 numanes;
tab1 vistype;

```

```

generate nummamog=0;
recode mammog -1 -7 -8 -9 2 95 .=0;
tab1 mammog;
sort dupersid mammog;
by dupersid mammog: replace nummamog=_N if mammog==1; /* count the # mammog per person */
tab1 nummamog;
by dupersid: replace nummamog=nummamog[_N];
tab1 nummamog;
tab1 vistype;

```

```

generate numvac=0;
recode rcvvac -1 -7 -8 -9 2 95 .=0;
tab1 rcvvac;
sort dupersid rcvvac;
by dupersid rcvvac: replace numvac=_N if rcvvac==1; /* count the # vaccines per person */
tab1 numvac;
by dupersid: replace numvac=numvac[_N];
tab1 numvac;
tab1 vistype;

```

```

generate numothsvce=0;
recode othsvce -1 -7 -8 -9 2 95 .=0;
tab1 othsvce;
sort dupersid othsvce;
by dupersid othsvce: replace numothsvce=_N if othsvce==1; /* count the # other services per person */
tab1 numothsvce;
by dupersid: replace numothsvce=numothsvce[_N];
tab1 numothsvce;
tab1 vistype;

```

```

/* Aggregate Events to Person Level */
sort dupsid vstype;
by dupsid vstype: generate numob=_N if vstype=="ob";
by dupsid vstype: generate numip=_N if vstype=="ip";
by dupsid vstype: generate numop=_N if vstype=="op";
by dupsid vstype: generate numer=_N if vstype=="er";
by dupsid vstype: generate numpm=_N if vstype=="pm";
by dupsid vstype: generate numhh=_N if vstype=="hh";
by dupsid: generate ambtotpd=sum(ambtotev);
by dupsid: generate ambfampd=sum(ambfamev);
by dupsid: drop if _n < _N; /* keep only one case per dupsid */
tab1 numeeg;
tab1 numekg;
tab1 numlab;
tab1 numsono;
tab1 numxray;
tab1 nummri;
tab1 numanes;
tab1 nummamog;
tab1 numvac;
tab1 numothsvce;
keep dupsid dupflg ambtotpd ambfampd hhnum hsnun opnum obnum dnnum ernun rxnum condbegy seedrev1 seedrev2
seedrev3 seedrev4
seedrev5 lstsaw1 stiltr1 stiltr2 stiltr3 stiltr4 stiltr5 numob numip numop numer numpm numhh numeeg numekg numlab
numsono
numxray nummri numanes nummamog numvac numothsvce evntidx obxp98x obsf98x eeg ekg
referdb seedoc medptype timespnt vstctgry vstrelcn physth occupth
speechth kidneyd ivther psychoth labtest sonogram xrays mammog mri rcvvac anesth othsvce surgproc surgnam medpresc
obicd1x obicd2x obicd3x obicd4x obpro1x obccc1x obccc2x obccc3x obccc4x evntidx opxp98x opfsf98x opdsf98x
opdateyr opdatemm opdatedd eeg ekg referdb seedoc medptype timespnt
vstctgry vstrelcn physth occupth speechth kidneyd ivther psychoth labtest sonogram xrays mammog mri
rcvvac anesth othsvce surgproc surgnam medpresc docoutf opicd1x opicd2x opicd3x opicd4x oppro1x opccc1x opccc2x
opccc3x opccc4x evntidx ipxp98x ipdsf98x ipfsf98x ipbegyr ipbegmm ipbegdd ipendyr ipendmm ipenddd numnighx
numnight emerroom specond rsninhs anyoper surgproc ipicd1x ipicd2x ipicd3x ipicd4x ippro1x ippro2x ipccc1x
ipccc2x ipccc3x ipccc4x dschpmed droutsid evntidx erxp98x erfsf98x erdsf98x erdateyr erdatemm erdatedd
seedoc vstctgry vstrelcn labtest sonogram xrays mammog mri ekg eeg rcvvac anesth othsvce surgproc surgnam
medpresc docoutf ericd1x ericd2x ericd3x erpro1x erccc1x erccc2x erccc3x evntidx hhsf98x hhsf98x
rxrecidx rxsf98x rxsp98x rxbegdd rxbegmm rxbegyr rxname rxhhname rxndc rxform rxstreng rxunit
rxunitos phartp1 phartp2 phartp3 phartp4 phartp5 phartp6 phartp7 rxicd1x rxicd2x rxicd3x rxccc1x rxccc2x
rxccc3x;
save "h:\Nicole\perev03.dta", replace;

```

```

/* Merge on Person Characteristics */
use "o:\STATA PUF Files\h28.dta", clear;
keep dupsid age31x age42x age53x sex racex racethnx inscov98 wtdper98 varstr98 varpsu98
marry31x marry42x marry53x mexamt98 tottch98 totslf98 totmcd98 obtotv98 obvtch98 obvexp98 obvslf98 obvmcd98
obvprv98 obdrv98 obchir98 obasst98 obther98 obothv98 obctch98 obnurs98 obntch98 obnexp98 obopto98 obeexp98
opdrv98 opvtch98 ertot98 ertfch98 erdex98
erdtch98 amntch98 amnexp98 amnsf98 ipdis98 ipdex98 ipdtch98 dvgen98 dvgtch98 dvgepx98 hhtotd98 hhagd98
visexp98 vistch98 rxtot98 rxexp98 rxslf98 totexp98 totprv98 ttp98x povcat98 wagep98x unemp98x pensp98x ssecp98x
pubp98x
educyr31 educyr42 educyr53 hideg31 hideg42 hideg53 empst42 empst53 empst31 cocc31 cocc42 cocc31
famsze98 fams1231 region98 rthlth53 rthlth42 rthlth31 rtprox53 rtprox42 rtprox31 mnhlth53 mnhlth42 mnhlth31
mnprox53 mnprox42 mnprox31 aidhlp53 aidhlp31 stpdif31 stpdif53 lftdif31 lftdif53 wkldif31 wkldif53 mildif31 mildif53
wklim53 wklim31 stndif31 stndif53 bendif31 bendif53 rchdif31 rchdif53
actlim53 actlim31 wrklim53 wrklim31 hselim53 hselim31 unable53
unable31 soclim53 soclim31 seedif42 blind42 readnw42

```

```

recpep42 vision42 anylim98 limact42 dentck98 bldpck98 cholck98 physcl98 flusht98 wrdent98 lostee98 prosex98 papsmr98
brstex98 mamgrm98 altcar98 altcvs98 altcve98 altcre98 altcrx98 praltx98 acupnc98 nutrit98 masage98 herbal98 biofdb98
medita98 homeo98 spirtl98 hypno98 tradit98 altoth98 masthe98 acpthe98 mdttrt98 nurtrt98 homemnd98 chiro98 clergy98
herbtr98
othalt98 altcsp98 dscalt98 refrmd98 dobyy;
recode region98 -1=".";
recode bldpck98 -9 -8 -7 -1 2 3 4 5=2;
tab1 bldpck98;
recode nutrit98 -9 -1=2;
tab1 nutrit98;
recode papsmr98 -9 -8 -7 -1 2 3 4 5=2;
tab1 papsmr98;
recode prosex98 -9 -8 -7 -1 2 3 4 5=2;
tab1 prosex98;
recode cholck98 -9 -8 -7 -1 2 3 4 5=2;
tab1 cholck98;
recode physcl98 -9 -8 -7 -1 2 3 4 5=2;
tab1 physcl98;
recode brstex98 -9 -8 -7 -1 2 3 4 5=2;
tab1 brstex98;
recode mamgrm98 -9 -8 -7 -1 2 3 4 5=2;
tab1 mamgrm98;
recode dentck98 -9 -8 -7 -1 2 3 4 5=2;
tab1 dentck98;
recode flusht98 -9 -8 -7 -1 2 3 4 5=2;
tab1 flusht98;
sort dupsid;
merge dupsid using "h:\Nicole\perev03.dta";
tab1 _merge;
generate diabetes=0;
replace diabetes=1 if _merge==3; /* create a variable to identify persons with diabetes */
generate age=age53x if age53x >= 0; /* construct age variable using round-specific variables */
replace age=age42x if age42x >= 0 & age53x < 0;
replace age=age31x if age31x >= 0 & (age42x < 0 & age53x < 0);
/*create new age categories*/
generate agecat=1 if age>=21 & age<=29;
replace agecat=2 if age>=30 & age<=39;
replace agecat=3 if age>=40 & age<=49;
replace agecat=4 if age>=50 & age<=59;
replace agecat=5 if age>=60 & age<=64;
generate anyins=0;
replace anyins=1 if inscov98==1 | inscov98==2; /* create health insurance indicator */
tab1 inscov98;
recode inscov98 3=".";
/* construct marry variable using round-specific variables */
recode marry31x 7=1;
recode marry53x 7=1;
recode marry42x 7=1;
recode marry31x 8=2;
recode marry53x 8=2;
recode marry42x 8=2;
recode marry31x 9=3;
recode marry53x 9=3;
recode marry42x 9=3;
recode marry31x 10=4;
recode marry53x 10=4;
recode marry42x 10=4;

```



```

generate marry=marry53x if marry53x>0;
replace marry=marry42x if marry42x>0 & marry53x<0;
replace marry=marry31x if marry31x>0 & (marry42x < 0 & marry53x < 0);
recode marry 6=".";
generate educyr=educyr53 if educyr53>=0; /* construct educyr variable using round-specific variables */
replace educyr=educyr42 if educyr42>=0 & educyr53<0;
replace educyr=educyr31 if educyr31>=0 & (educyr42 < 0 & educyr53 < 0);

generate hideg=hideg53 if hideg53>=0; /* construct hideg variable using round-specific variables */
replace hideg=hideg42 if hideg42>=0 & hideg53<0;
replace hideg=hideg31 if hideg31>=0 & (hideg42 < 0 & hideg53 < 0);
recode hideg 8=".";
/* construct emplstat variable using round-specific variables */
recode empst31 2=1;
recode empst31 3=1;
recode empst31 4=2;
recode empst42 2=1;
recode empst42 3=1;
recode empst42 4=2;
recode empst53 2=1;
recode empst53 3=1;
recode empst53 4=2;
generate emplstat=empst53 if empst53>=0;
replace emplstat=empst42 if empst42>=0 & empst53<0;
replace emplstat=empst31 if empst31>=0 & (empst42 < 0 & empst53 < 0);
/* construct occup variable */
recode coccp53 13=".";
recode coccp42 13=".";
recode coccp31 13=".";
generate occup=coccp53 if coccp53>=0;
replace occup=coccp42 if coccp42>0 & coccp53<0;
replace occup=coccp31 if coccp31>0 & (coccp42 < 0 & coccp53 < 0);
generate dobyr=doby; /* construct year of birth variable */
generate hlthstat=rthlth53 if rthlth53>=0; /* construct hlthstat variable using round-specific variables */
replace hlthstat=rthlth42 if rthlth42>=0 & rthlth53<0;
replace hlthstat=rthlth31 if rthlth31>=0 & (rthlth42 < 0 & rthlth53 < 0);
generate hlthprox=rtprox53 if rtprox53>=0; /* construct (hlthprox)self,proxy health rating variable using round-specific variables */
replace hlthprox=rtprox42 if rtprox42>=0 & rtprox53<0;
replace hlthprox=rthlth31 if rtprox31>=0 & (rtprox42 < 0 & rtprox53 < 0);
generate mnhlth=mnhlth53 if mnhlth53>=0; /* construct mental health rating variable using round-specific variables */
replace mnhlth=mnhlth42 if mnhlth42>=0 & mnhlth53<0;
replace mnhlth=mnhlth31 if mnhlth31>=0 & (mnhlth42 < 0 & mnhlth53 < 0);
generate mnprox=mnprox53 if mnprox53>=0; /* construct mental health rating self, proxy variable using round-specific variables */
replace mnprox=mnprox42 if mnprox42>=0 & mnprox53<0;
replace mnprox=mnprox31 if mnprox31>=0 & (mnprox42 < 0 & mnprox53 < 0);
generate aidhlp=aidhlp53 if aidhlp53>=0; /* construct uses assistive devices variable using round-specific variables */
replace aidhlp=aidhlp31 if aidhlp31>=0 & (aidhlp53 < 0);
generate wlklim=wlklim53 if wlklim53>=0; /* construct walk limitations variable using round-specific variables */
replace wlklim=wlklim31 if wlklim31>=0 & (wlklim53 < 0);
generate stpdif=stpdif53 if stpdif53>=0; /* construct difficulty walking up 10 steps variable using round-specific variables */
replace stpdif=stpdif31 if stpdif31>=0 & (stpdif53 < 0);
generate lftdif=lftdif53 if lftdif53>=0; /* construct difficulty lifting 10 lbs variable using round-specific variables */
replace lftdif=lftdif31 if lftdif31>=0 & (lftdif53 < 0);
generate wlkdif=wlkdif53 if wlkdif53>=0; /* construct difficulty walking 3 blocks variable using round-specific variables */
replace wlkdif=wlkdif31 if wlkdif31>=0 & (wlkdif53 < 0);

```

```

generate mildif=mildif53 if mildif53>=0; /* construct difficulty walking 1 mile variable using round-specific variables */
replace mildif=mildif31 if mildif31>=0 & (mildif53 < 0);
generate bendif=bendif53 if bendif53>=0; /* construct difficulty bending variable using round-specific variables */
replace bendif=bendif31 if bendif31>=0 & (bendif53 < 0);
generate stdif=stdif53 if stdif53>=0; /* construct difficulty standing 20 min variable using round-specific variables */
replace stdif=stdif31 if stdif31>=0 & (stdif53 < 0);
generate rchdif=rchdif53 if rchdif53>=0; /* construct difficulty reaching overhead variable using round-specific variables */
replace rchdif=rchdif31 if rchdif31>=0 & (rchdif53 < 0);
generate actlim=actlim53 if actlim53>=0; /* construct activity limitations variable using round-specific variables */
replace actlim=actlim31 if actlim31>=0 & (actlim53 < 0);
generate wrklim=wrklim53 if wrklim53>=0; /* construct work limitations variable using round-specific variables */
replace wrklim=wrklim31 if wrklim31>=0 & (wrklim53 < 0);
generate hselim=hselim53 if hselim53>=0; /* construct house limitations variable using round-specific variables */
replace hselim=hselim31 if hselim31>=0 & (hselim53 < 0);
generate unable=unable53 if unable53>=0; /* construct unable to do any activity variable using round-specific variables */
replace unable=unable31 if unable31>=0 & (unable53 < 0);
generate soclim=soclim53 if soclim53>=0; /* construct social limitations variable using round-specific variables */
replace soclim=soclim31 if soclim31>=0 & (soclim53 < 0);
recode seedif42 -9 -8 -7 -1=2;
generate seedif=seedif42; /* construct seeing difficulty variable using round-specific variables */
recode blind42 -9 -8 -7 -1=2;
generate blind=blind42; /* construct blind variable using round-specific variables */
recode readnw42 -9 -8 -7 -1=2;
generate readnw=readnw42; /* construct newsprint variable using round-specific variables */
recode recpep42 -9 -8 -7 -1=2;
generate recpep=recpep42; /* construct recognize people variable using round-specific variables */
recode vision42 -9 -8 -7 -1=2;
generate vision=vision42; /* construct vision impairment variable using round-specific variables */
generate race=1 if racex==5 & racethnx~=1; /* White - not Hispanic */
replace race=2 if racex==4 & racethnx~=1; /* Black - not Hispanic */
replace race=3 if racethnx==1; /* Hispanic */
replace race=4 if racex==1 | racex==2 | racex==3; /* Other */
recode race 4= ".";
label define racelbl 1 "White, not Hispanic" 2 "Black, not Hispanic" 3 "Hispanic" 4 "Other";
label values race racelbl;
label define sexlbl 1 "Male" 2 "Female";
label values sex sexlbl;
generate mysample=0;
replace mysample=1 if [(age<=64 & age>=21) & (race<=3) & (diabetes>0) & (anyins>0)]; /*create subpop for my sample
which includes all individuals*/
generate mysample1=0;
replace mysample1=1 if [(age<=64 & age>=21) & (race<=3) & (diabetes>0) & (anyins>0) & (sex==1)]; /*create subpop for
males*/
generate mysample2=0;
replace mysample2=1 if [(age<=64 & age>=21) & (race<=3) & (diabetes>0) & (anyins>0) & (sex==2)]; /*create subpop for
females*/

generate mysample3=0;
replace mysample3=1 if [(age<=64 & age>=21) & (race<=3) & (diabetes>0) & (inscov98==1)]; /*create subpop for
privately insured*/

generate mysample4=0;
replace mysample4=1 if [(age<=64 & age>=21) & (race<=3) & (diabetes>0) & (inscov98==2)]; /*create subpop for publicly
insured*/

replace ambtotpd=0 if ambtotpd==.;
replace ambtotpd=0 if ambtotpd < 0;

```

```

replace ambfampd=0 if ambfampd==.;
replace ambfampd=0 if ambfampd < 0;
replace numob=0 if numob==.;
replace numip=0 if numip==.;
replace numop=0 if numop==.;
replace numer=0 if numer==.;
replace numpm=0 if numpm==.;
replace numhh=0 if numhh==.;
tab1 hhnum hsnun opnum obnum dnnum ernum rxnum if diabetes==1;

```

```

generate educyrlog=log(educyr);
generate famsze98log=log(famsze98);
generate agelog=log(age);
generate mexamt98log=log(mexamt98);
generate ttip98xlog=log(ttip98x);
generate pubp98xlog=log(pubp98x);
generate tottch98log=log(tottch98);
generate totslf98log=log(totslf98);
generate obtotv98log=log(obtotv98);
generate opdrv98new=(opdrv98 + 0.10);
generate opdrv98log=log(opdrv98new);
generate obopto98new=(obopto98 + 0.10);
generate obopto98log=log(obopto98new);
generate obvtch98log=log(obvtch98);
generate dvgen98log=log(dvgen98);
generate dvgtch98new=(dvgtch98 + 0.01);
generate dvgtch98log=log(dvgtch98new);
generate dvgepx98new=(dvgepx98 + 0.01);
generate dvgepx98log=log(dvgepx98new);
generate rxtot98new=(rxtot98+0.10);
generate rxtot98log=log(rxtot98new);
generate rxexp98new=(rxexp98 + 0.01);
generate rxexp98log=log(rxexp98new);
generate rxslf98new=(rxslf98 + 0.01);
generate rxslf98log=log(rxslf98new);
generate totexp98log=log(totexp98);

```

```

save "h:\Nicole\diabetes1998a03expend.dta", replace;
log close;

```

```
#delimit ;
clear;
set mem 200000;
```

```
*
```

```
-----
*This is the analytic do file that recodes the strata by all race categories and then by each race
*(i.e. Hispanic, Black, and Caucasian). Also other commands such as descriptives, anova, chi-square,
*and regressions are done in this program. This program uses NicoleV03expenditures.do file.
```

```
*
```

```
-----;
```

```
log using "h:\Nicole\NicoleLog52003.log", replace;
use "h:\Nicole\diabetes1998a03expend.dta";
```

```
svyset psu varpsu98;
svyset pweight wtdper98;
```

```
/*New strata for all races betw 21 and 64 yrs, with Type 2 diabetes, and with insurance*/
generate newstr1 =varstr98;
recode newstr1 3=2 13=12 15 17=14 18 19 21=20 22 23 25=24 30=29 37=36 39=38 41 42=43 49 50=48
53=52 65=64 67 68=68 69=70 72 73=71 75=74 94=93;
```

```
/*New strata for all Caucasians betw 21 and 64 yrs, with Type 2 diabetes, and with insurance*/
generate newstr2=varstr98;
recode newstr2 3=2 6=5 13 14 15 17=12 19 20 21 22 23=24 25 28 30 31=29 32 33 34=35 37=36
39 40=38 41 42=43 47 48=46 50=51 53=52 58=56 65=64 67 68=66 71 72=70 73 74=76 77 79=78
93 94=92 95=96;
```

```
/*New strata for all Blacks betw 21 and 64 yrs, with Type 2 diabetes, and with insurance*/
generate newstr3=varstr98;
recode newstr3 1 3=5 9 10 11=8 13 14 18=20 22 25 26=24 36 37=34 42=38 51=48 60 65 66=54
71 75 77 78 79=80 85 86 87=82 90 93 95 97=98;
```

```
/*New strata for all Hispanics betw 21 and 64 yrs, with Type 2 diabetes, and with insurance*/
generate newstr4=varstr98;
recode newstr4 1 6=8 9 13=20 28 31=27 32 33=34 36=40 49=45 55 58 63=54 65 67 69 70 74 79=71
80 84 86 87 94=97 98=100;
```

```
/*New strata for all race MEN ONLY betw 21 and 64 yrs, with Type 2 diabetes, and with insurance*/
generate newstr5=varstr98;
recode newstr5 3=2 6=5 13 14=12 15 19=20 22 24 25=27 31=28 37 38=36 39 40=43 49 50=48 51=52 53=54
58=56 62=60 65 66=64 67 69 70=71 73=74 81=80 84=83 87 88=86 89 91 92=90 93 94 95 96=97;
```

```
/*New strata for all race WOMEN ONLY betw 21 and 64 yrs, with Type 2 diabetes, and with insurance*/
generate newstr6=varstr98;
recode newstr6 1 3=4 10 12 13=11 15 17=14 18 19 21 22=20 25=24 30=29 32=31 35=34 37=36 41 42=40
48 49 51=52 58 59=54 62=61 65 66 67=63 68=70 72 74=71 77=76 84 85=83 92 93=91 94 95 96=97;
```

```
/*New strata for Caucasian MEN ONLY betw 21 and 64 yrs, with Type 2 diabetes, and with insurance*/
generate newstr7=varstr98;
recode newstr7 2=1 3 6=5 9 10=11 13 14 15 19=12 20 22 25 28 31 32=35 37 38=36 39 40=43 48 50=46 51 52 53=54
58=56 62 63=60 65 66 67=64 71 73 74=76 77=78 81=82 84 85=83 87 88 89=86 91 92 93 94=90
96 97 98=100;
```

```
/*New strata for Caucasian WOMEN ONLY betw 21 and 64 yrs, with Type 2 diabetes, and with insurance*/
generate newstr8=varstr98;
recode newstr8 1 5=4 6 8 10=9 12 13 14 15=11 17 19 21 22 23=24 25 30 32=29 33 34 35=36 37 40 41=38
42=45 47 48=46 51=52 59=54 62=61 66 68=63 72=70 77 78 79=76 84 85=83 92 94 95=91 96 97 98=99;
```

/*New strata for Black MEN ONLY betw 21 and 64 yrs, with Type 2 diabetes, and with insurance*/

generate newstr9=varstr98;

recode newstr9 1 3 8 9 10=5 11 20 22 24 31 45=46 48=52 66 71 77 79=54 85 90 95 98=100;

/*New strata for Black WOMEN ONLY betw 21 and 64 yrs, with Type 2 diabetes, and with insurance*/

generate newstr10=varstr98;

recode newstr10 3 5 11 13=8 14 18 24=20 25 26=31 36 37=34 42=38 46=45 48 51=47 60 65=54 75 78=80

86 87 93 97 98=82;

/*New strata for Hispanic MEN ONLY betw 21 and 64 yrs, with Type 2 diabetes, and with insurance*/

generate newstr11=varstr98;

recode newstr11 1=20 28 32 40=34 49=45 55 63=54 67 69 70 74=71 84 86 94=97 98=100;

/*New strata for Hispanic WOMEN ONLY betw 21 and 64 yrs, with Type 2 diabetes, and with insurance*/

generate newstr12=varstr98;

recode newstr12 6 9 13=8 31 33 34=27 36 40 49=45 58 63 65=54 67 74 79=71 80 86 87 98 100=97;

/*New strata for public insurance only*/

generate newstr13=varstr98;

recode newstr13 1 2 3=4 5 6 7=8 11 12 13 15 18 19=9 22 23 26=20 32 33 36 38 42 43=34 44=45 48 51 52 53 55=54 58 59
61 62 63 66 67 69=60

77=78 85=86 90 92 93 94 96 97 98 99=100;

log close;